Occupational Outlook for College Graduates, 1980-81 Edition

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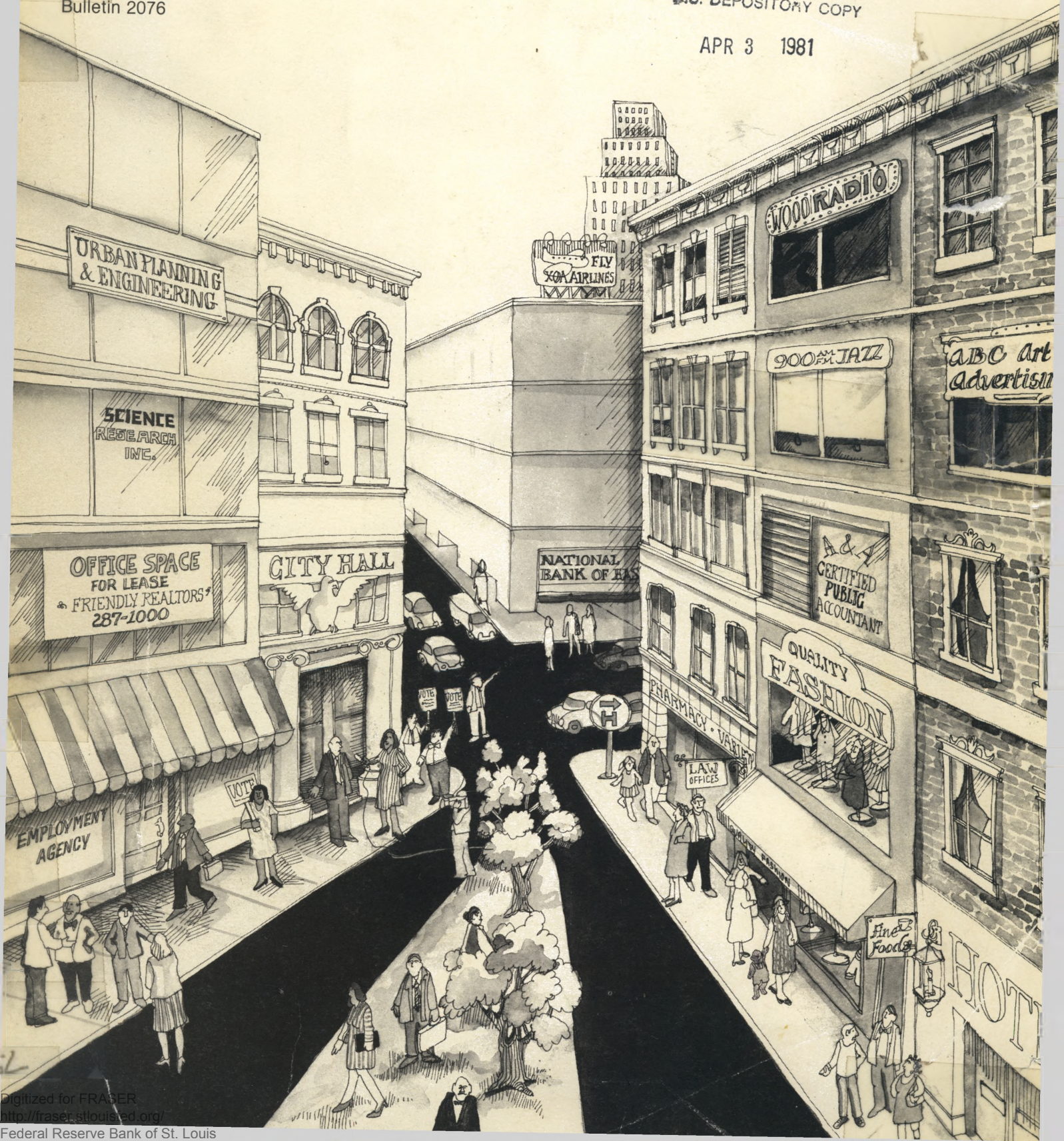

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U.S. Department of Labor
Ray Marshall, Secretary
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Preface

Career planning has become increasingly important to college graduates who seek a rewarding career. During the 1970's, the number of college graduates entering the labor force exceeded the number of job openings in the kinds of jobs usually sought by graduates. As a result, college graduates, as a group, faced competition for the jobs they wanted. However, graduates prepared to enter some occupations fared much better than those prepared to enter others. This competition for jobs is likely to continue through the 1980's. Graduates who choose their career field unwisely or who are least qualified will probably continue to face difficulties finding the kinds of jobs they want.

The *Occupational Outlook for College Graduates* is a guide to career opportunities in a broad range of occupations for which a college degree is, or is becoming, the usual background for employment. It contains a brief summary of the expected changes in the economy, in addition to an analysis of the overall supply and demand situation for college graduates through the 1980's. Each occupational statement presents information on the nature of the work; places of employment; education, skills, and abilities required for entry; employment outlook; related occupations; and earnings.

The assessment of employment outlook for college graduates was prepared by Jon Q. Sargent, Division of Occupational Outlook.

Contents

HOW TO USE THIS BOOK

As the economy grows and as new technologies and ways of doing business are developed, the variety of careers from which to choose increases. According to the *Dictionary of Occupational Titles,* there currently are more than 20,000 separate jobs in our economy. But most of us are familiar with only a few of these, usually the occupations of people we know or the characters we see on television or in films. Since choosing a career is one of the most important decisions a person can make, you should take some time to fully explore the possibilities before you make a selection. You may be surprised to discover that a job you never heard of, or never seriously considered seems right for you. Or, you may find that the career you now have in mind still seems like a good choice, and you can make your plans more confidently.

One way to begin studying about careers is to look through the *Occupational Outlook for College Graduates.* This chapter describes the information presented and offers some useful hints on how to use it to help you find the right career. The occupational statements that follow the four introductory chapters are reprinted from the 1980–81 edition of the *Occupational Outlook Handbook.* These occupations generally are those of greatest interest to college students and graduates, and are those for which a college education is required, is becoming increasingly necessary, or is the usual educational background for employment. Occupations covered include workers in professional and related occupations, sales occupations, managerial and administrative occupations, and service occupations. The statements in this publication account for about 90 percent of all workers in professional and related occupations, and for smaller proportions of workers in other major groups. Almost three-fifths of all college graduates work in professional and related occupations; smaller proportions are in other major occupational groups.

Where do I start?

Like a dictionary, encyclopedia, or other reference book, the *Occupational Outlook for College Graduates* has no beginning or ending point. You can simply look through the table of contents or index, find the occupation(s) you are interested in, and read those sections. If you want to know more about the working world, read the section on Tomorrow's Jobs for College Graduates. It explains some of the changes taking place in the job market today, and what is expected to happen through the 1980's.

If you are just beginning to think about planning for a career, you may wonder what things you should consider. Start with what you know about your own interests and abilities. Does science or art interest you? Do you enjoy working with your hands and building things, or do you really prefer working with people? Is money, recognition, or being a leader important to you? The answers to these and similar questions can help you discover your own characteristics. Understanding something about yourself is important because your traits, abilities, and goals will largely determine whether you will like working in a particular job and if, in fact, you can do that job well. Your school counselor or another professional trained in human behavior can help you ask yourself the right questions. Talking with your family and friends can help you learn about yourself, too.

Once you have decided what your interests are, look in the alphabetical list of occupational reports provided in the table of contents to find occupations that appear to match your interests.

What will I learn?

Once you have chosen a place to begin—an occupation you'd like to learn more about—you can use the *Occupational Outlook for College Graduates* to find out what the job is like, what education and training are needed; what the advancement possibilities, earnings, and employment outlook are likely to be; and also related occupations you might want to explore. Each section of this book follows a standard format, making it easier to compare different jobs. What follows is a description of the type of information presented in each occupational section with some hints on how to use this information.

About those Numbers at the Head of Each Statement

The numbers in parentheses that appear just below the title of most occupations chapters are *D.O.T.* code numbers. D.O.T. stands for the *Dictionary of Occupational Titles* (fourth edition), a U.S. Department of Labor publication, now in its fourth edition. Each number helps classify jobs by the type of work done, training required, physical demands, and working conditions. D.O.T. numbers are used by public employment service agencies for classifying applicants and job openings, and for reporting and other operating purposes. They are included in the *Occupational Outlook for College Graduates* because career information centers and libraries frequently use them for filing occupational information.

The **Nature of the Work** section describes the major duties of workers in the occupation. It tells what workers do on the job, what tools or equipment they use, and how they do their work. Although the descriptions are typical of each job, there are many occupations where the work varies with the size or type of employer. For example, a registered nurse who works in an elementary school will spend more time treating minor injuries and soothing children's feelings than one who works in a hospital. There also are many fields of work that contain specialties; teaching and medicine are good examples.

An important part in your career decision will probably be whether the work done on the job appeals to you, so try to find out as much as possible about work in those occupations which interest you. The next chapter of the *Occupational Outlook for College Graduates*—Where to Go for More Information—suggests ways to learn more about jobs. You also can look for more information in your school library or counseling center. If you and your counselor can arrange it, talk to someone who works in the occupation or, even better, watch them on the job.

Working conditions also are very important to consider when finding a career that appeals to you. Some people, for example, like outdoor work because of the chance to enjoy beautiful weather and the freedom that often goes with this type of job. Others like to work in an office to avoid bad weather and, usually, noise and dirt, too. A list of working conditions common to different occupations in this book follows. Since those you feel strongly about, whether you like or dislike them, can make a job more or less attractive, you should consider them when making your decision.

Overtime work. When overtime is required on a job, employees must give up some of their free time and be flexible in their personal lives. Usually, however, overtime does offer added income or a chance to earn extra days off.

Shift work. Evening or nightwork is part of the regular work schedule in many jobs. Broadcast technicians and newspaper reporters, for example, may be required to work these shifts on a permanent basis. Workers in other occupations, such as nurses and police officers, may work nights on a rotating basis. Still other workers may be assigned to split shifts: Airplane pilots, for example may have time off during layovers between flights. Some people prefer shift work because they can pursue leisure activities or take care of errands during daytime hours.

Environment. Work settings vary greatly. People work in office buildings; on construction sites; in mines, factories, restaurants, and stores; and on ships and planes. Some people like a quiet, air-conditioned setting, others prefer the hum of machinery. By knowing the setting of jobs you find interesting, you can avoid working in an environment that you would find unpleasant.

Outdoor work. Many workers have to be outdoors some or all of the time. Police officers, surveyors and foresters are examples. Being exposed to all types of weather may be preferred to indoor work, however, by those who enjoy the outdoors and consider it healthy.

Hazards. Some jobs are potentially dangerous. Cuts, burns, and falls can occur in restaurant kitchens, factory assembly lines, and laboratories, for example. Consequently, many jobs, such as mining and construction work, require the use of specially designed equipment and protective clothing.

Physical demands. Some jobs require standing, crouching in awkward positions, or are otherwise strenuous. Be sure you have the physical strength and stamina the work you are interested in requires.

The **Places of Employment** section provides information on the number of workers in an occupation and tells whether they are concentrated in certain industries or geographic areas. The size of an occupation is important to a jobseeker because large occupations, even those growing slowly, offer more openings than small ones as many workers retire or die each year.

Some occupations, such as bank officers and buyers, are concentrated in particular industries. Other occupations, such as accountants, are found in almost every industry. If an occupation is found primarily in certain industries, this section lists them.

A few occupations are concentrated in certain parts of the country. Actors and actresses, for example, usually work in California or New York. This information is included for the benefit of people who have strong preferences about where they live. For most occupations, however, employment is widely scattered and generally follows the same pattern as the distribution of the population.

In addition, information on part-time employment is included because it is important to students, homemakers, retired persons, and others who may want to work part time. Knowing which occupations offer good opportunities for part-time work can be a valuable lead in finding a job.

The **Training, Other Qualifications, and Advancement** section should be read carefully because preparing for an occupation can mean a considerable investment of time and money. If you currently are in school, it's a good idea to look closely at the list of high school and college courses considered useful preparation for the career you have in mind.

Workers can prepare for jobs in a variety of ways, including college study leading to a degree, certificate, or associate degree; programs offered by public and private postsecondary vocational schools; home study courses; government training programs; experience or training obtained in the Armed Forces; apprenticeship and other formal training offered by employers; and high school courses. For each occupation, the *Occupational Outlook for College Graduates* identifies which way is preferred. In many cases, alternative ways of obtaining training are listed as well. It is worth remembering that the level at which you enter an occupation and the speed with which you advance often are determined by the amount of training you have.

Many occupations are natural stepping stones to others. After working for a time as a computer programmer, for example, many people advance to jobs as systems analysts. The world of work is constantly changing and fewer people spend their lives in one or even two occupations. Some have several jobs over a lifetime, changing careers as they learn new skills or feel a need to try another line of work. If a pattern of movement from one occupation to another exists, it is discussed in this portion of each occupational statement.

Information on occupational mobility can be useful in several ways. It is helpful to know, for example, that skills gained working at one job can make you more employable in another—perhaps a job that is more desirable in terms of earnings, working conditions, or scope for self-expression. On the other hand, it also is useful to know which jobs offer the most opportunity for transferring to other work of a similar nature. Persons trained in electrical or chemical engineering, for example, frequently can transfer to another engineering specialty where they can apply general engineering knowledge in different ways.

In some cases, moving from one occupation to another takes more than the training or experience acquired on the job. For example, an engineering technician usually must have additional specialized training before advancing to an engineering job. Many statements describe the possibilities for advancement after additional training and note in-service programs that allow employees to gain needed skills while continuing to work part time.

It usually is wise to discuss the patterns of job transfer and advancement described in this book with counselors, local employers, and others who know about the particular job market where you want to work. The average patterns of movement from one occupation to another may not exist in every industry or area.

One more factor you must consider is that all States have certification or licensing requirements for some occupations. Physicians and nurses, elementary and secondary school teachers, and real estate agents and brokers are examples of workers who must be licensed. If you are considering an occupation that is licensed, be sure to check the requirements in the State in which you plan to work because a license from one State may not be valid in another. Common requirements for a license include completion of a State-approved training or educational program and a passing grade on a written test.

A very important item to consider when making a career choice is the extent to which a particular job matches your personality. Although it often is difficult for people to assess themselves, your counselor undoubtedly is familiar with tests that can help you learn about yourself. For each occupation described in information is provided which allows you to match you own unique personal characteristics—your likes and dislikes—with the characteristics of the job. A particular job could require a person who is able to do one or more of the following:

—make responsible decisions.
—motivate others.
—direct and supervise others.
—work in a highly competitive atmosphere.
—enjoy working with ideas and solving problems.
—enjoy working with people.
—enjoy working with tools or machinery—good coordination and manual dexterity are necessary.
—work independently—initiative and self-discipline are necessary.
—work as part of a team.
—enjoy working with detail, either numbers or technical written material.
—enjoy helping people.
—use creative talents and ideas and enjoy having an opportunity for self-expression.
—derive satisfaction from seeing the physical results of your work.
—work in a confined area.
—perform repetitious work.
—enjoy working outside, regardless of the weather.

Most jobs require some combination of these characteristics.

The **Employment Outlook** section discusses prospective job opportunities. Knowing whether or not the job market is likely to be favorable is quite important in deciding whether to pursue a specific career. While your interests, abilities, and career goals are extremely important, you also need to know something about the availability of jobs in the fields that interest you most.

In most cases, the description of employment outlook for an occupation begins with a sentence about the expected change in employment through the 1980's. The occupation is described as likely to grow about as fast as, faster than, or slower than the average for all occupations (figure I). Job opportunities in a particular occupation usually are favorable if employment is expected to increase at least as rapidly as for the economy as a whole. Occupations in which employment is likely to stay about the same or to decline generally offer less favorable job prospects.

In some cases, a statement is made about the effect fluctuations in economic activity

Figure I

Description	Projected 1978–90 change in employment requirements
Much faster than the average for all occupations	50.0 percent or more
Faster than the average for all occupations	25.0 to 49.9 percent
About as fast as the average for all occupations[1]	15.0 to 24.9 percent
More slowly than the average for all occupations	5.0 to 14.9 percent
Little change is expected	4.9 to −4.9 percent
Expected to decline	−5.0 percent or more

[1]The average increase projected for all occupations for the 1978–90 period is 20.8 percent.

have on employment in the occupation. This information is valuable to people looking into long-range career possibilities at a time when the economy is in a recession. People understandably wonder: What will the economy be like when I enter the labor market? Will it be harder to find a job 5 or 10 years from now than it is today? The *Occupational Outlook for College Graduates* gives information, wherever feasible, on occupations whose levels of employment fluctuate in response to shifts in the economic climate. It is important to bear in mind that employment in many—but not all—occupations is directly affected by an economic downturn. A sharp improvement in the outlook for these occupations is likely as the economy picks up. However, other occupations are less vulnerable to short-term changes in economic activity. Their growth or decline is influenced by other factors discussed in this section.

For some occupations, information is available on the supply of workers—that is, the number of people pursuing the type of education or training needed and the number subsequently entering the occupation. When such information is available, the *Occupational Outlook for College Graduates* describes prospective job opportunities in terms of the expected demand-supply relationship. The prospective job situation is termed excellent when the demand for workers is likely to greatly exceed the supply of workers; keenly competitive when the supply of workers is likely to exceed the demand for them. The precise terms used in this book are shown in figure II.

Workers who transfer into one occupation from another sometimes are a significant part of the supply of workers; similarly, those who transfer out may have a substantial effect on demand for workers because their leaving usually creates job openings. Although the information currently available on transfers among occupations is limited, the *Occupational Outlook for College Graduates* describes transfer patterns and their effect on the supply of workers for certain occupations. The employment outlook for engineers, for example, notes that transfers into the field are likely to constitute a substantial portion of supply, if past trends continue.

The information in the employment outlook section should be used carefully, however. The prospect of relatively few openings, or of strong competition, in a field that interests you should make you take a second look at your career choice. But this information alone should not prevent you from pursuing a particular career, if you feel confident in your ability and are determined to reach your goal. Getting a job may be difficult if the field is so small that openings are few (actuaries and city managers are examples) or so popular that it attracts many more jobseekers than there are jobs (radio and television broadcasting, journalism, the performing arts, and modeling). Getting a job also can be difficult in occupations in which employment is declining such as secondary school teachers, although this is not always the case.

Remember, even occupations that are small or overcrowded provide some jobs. So do occupations in which employment is growing very slowly or even declining, for there is a need to replace workers who leave the occupation. If the occupation is large, the number of job openings arising from replacement needs can be quite substantial. Accountants, teachers, and police officers are examples of large occupations that provide a significant number of job openings each year because workers leave. On the average, openings resulting from replacement needs are expected to account for the vast majority of all job openings in the next 10 years.

In other words, *don't* rule out a potentially rewarding career simply because the prospective outlook in an occupation is not favorable. *Do* discuss your abilities and aptitudes with your counselor. Getting more information is a good idea, too—look at the section on Where to Go for More Information for suggested ways to find out more about job outlook.

Figure II

Job opportunities	Prospective demand-supply relationship
Excellent	Demand much greater than supply
Very good	Demand greater than supply
Good or favorable	Rough balance between demand and supply
May face competition	Likelihood of more supply than demand
Keen competition	Supply greater than demand

How reliable is the information on the outlook for employment over the next 10 years? No one can predict future labor market conditions with perfect accuracy. In every occupation and industry, the number of jobseekers and the number of job openings constantly changes. A rise or fall in the demand for a product or service affects the number of workers needed to produce it. New inventions and technological innovations create some jobs and eliminate others. Changes in the size or age distribution of the population, work attitudes, training opportunities, or retirement programs determine the number of workers available. As these forces interact in the labor market, some occupations experience a shortage of workers, some a surplus, some a balance between jobseekers and job openings. Methods used by economists to develop information on future occupational prospects differ, and judgments that go into any assessment of the future also differ. Therefore, it is important to understand what underlies each statement on employment outlook.

For every occupation covered in the *Occupational Outlook for College Graduates* an estimate of future employment needs is developed. These estimates are consistent with a set of assumptions about the future of the economy and the country. For a more detailed explanation of how these projections are developed, see the chapter on Assumptions and Methods Used In Preparing the Employment Projections.

Finally, you should remember that job prospects in your community or State may not correspond to the description of the employment outlook in this book. For the particular job you are interested in, the outlook in your area may be better or worse. This book does not discuss the outlook in local areas; such information has been developed, however, by many States and localities. The local office of your State employment service is the best place to ask about local and area employment projections. Names and addresses of these State and local information sources and suggestions for additional information on the job market are given in the following chapter, Where to Go for More Information.

The **Earnings** section helps answer many of the questions that you may ask when choosing a career. Will the income be high enough to maintain the standard of living I want and to justify my training costs? How much will my earnings increase as I gain experience? Do some areas of the country or some industries offer better pay than others for the same type of work?

Like most people, you probably think of earnings as money—a paycheck in the bank or cash in the pocket. But money is only one type of financial reward for work. Paid vacations, health insurance, uniforms, and discounts on clothing or other merchandise also are part of total earnings.

Table 1. Career ladder of accountants

	Average annual earnings, 1978
Beginning accountants	$12,785
Experienced accountants	19,484
Chief accountants	28,928

SOURCE: Bureau of Labor Statistics.

For about 9 out of 10 workers, money income is received in the form of a *wage or salary.* A wage usually is an hourly or daily rate of pay, while a salary is a weekly, monthly, or yearly rate. Most craft workers, operatives, and laborers are wage earners, while most professional, technical, and clerical workers are salary earners.

In addition to their regular pay, wage and salary workers may receive extra money for working overtime. Those who work on a night shift or who work irregular hours often receive extra pay called a shift differential. Workers in some occupations also receive tips based on the services they provide customers. Securities sales workers and real estate agents are among those who are paid a commission—a percent of the amount they sell. Factory workers are sometimes paid a piece rate, which is an extra payment for each item they produce. For many workers, these types of pay amount to a large part of their total earnings.

The remaining 10 percent of all workers are in business for themselves and earn *self-employment income* instead of wages or salaries. This group includes workers in a wide variety of occupations: Physicians, shopkeepers, writers, photographers, and farmers are examples of workers who frequently are self-employed.

Some occupations may offer workers a chance to supplement their wage or salary income with self-employment income. For example, salaried lawyers often have a private practice, seeing clients during evenings or weekends, and college professors frequently publish articles based on independent research.

Besides money income, most wage and salary workers receive a variety of *fringe benefits* as part of their earnings on the job. Several are required by Federal and State law, including social security, workers' compensation, and unemployment insurance. These benefits provide income to persons when they are not working because of old age, work-related injury or disability, or lack of suitable jobs.

Among the most common fringe benefits are paid vacations, holidays, and sick leave. In addition, many workers are covered by life, health, and accident insurance; participate in retirement plans; and are entitled to supplemental unemployment benefits. All of these benefits are provided—in part or in full—through their employers. Some employers also offer stock options and profit-sharing plans, savings plans, and bonuses.

Workers in many occupations receive part of their earnings in the form of goods and services, or *payments in kind.* Sales workers in department stores, for example, often receive discounts on merchandise. Workers in other jobs may receive uniforms, business expense accounts, free meals, housing, or free transportation on company-owned planes.

Which jobs pay the most? This is a difficult question to answer because good information is available for only one type of earnings—wages and salaries—and for some occupations even this is unavailable. Nevertheless, the *Occupational Outlook for College Graduates* does include some comparisons of earnings among occupations. Generally, earnings are compared to the average earnings of workers in private industry who are not supervisors and not in farming. This group represented about 60 percent of all workers in 1978.

Besides differences among occupations, many levels of pay exist within each occupation. Beginning workers almost always earn less than those who have been on the job for some time because pay rates increase as workers gain experience or do more responsible work. An example is shown in table 1.

Earnings in an occupation also vary by geographic location. The average weekly earnings of beginning computer programmers, for example, vary considerably from city to city. (See table 2.) Of the 10 cities listed, the highest earnings occurred in Detroit, Mich., and the lowest in Boston, Mass. Although it is generally true that earnings are higher in the North Central and Northeast regions than in the West and South, there are exceptions. You also should keep in mind that those cities which offer the highest earnings are often those in which it is most expensive to live.

In addition, workers in the same occupation may have different earnings depending on the industry in which they work. For example, in 1978, chemists averaged $29,100 a year in manufacturing, $26,300 in nonprofit research institutions, $22,700 in colleges and universities, and $19,400 in State and local government.

Salaries also vary by the specialty or type of work performed. Surgeons, for example, earn more on the average than pediatricians or general practitioners. (See table 3.) Also, in most occupations, workers who become supervisors or managers earn more than their fellow workers.

Because of all these variations in earnings, you should check with a counselor or with local employers if you are interested in specific earnings information for occupations in your area.

The **Related Occupations** section is appearing for the first time in this edition of the *Occupational Outlook for College Graduates.* If you find that an occupation you are reading about appeals to you, you also may wish to explore the jobs listed in this section. Usually, the related occupations are those that require similar aptitudes, interests, and education and training.

Table 2. Average weekly earnings of beginning computer programmers, 1978, selected cities

City	Average weekly earnings
Detroit	$283.00
Milwaukee	282.00
Cleveland	260.50
Chicago	260.00
Houston	257.50
Newark	254.50
Minneapolis–St. Paul	241.50
Baltimore	234.00
Birmingham	228.50
Boston	210.50

SOURCE: Bureau of Labor Statistics.

Table 3. Median annual earnings of private physicians, 1977, by specialty

Specialty	Earnings
Orthopedic surgeons	$91,940
General surgeons	68,720
Pediatricians	54,180
General practitioners	51,000

SOURCE: *Medical Economics.* After tax-deductible expenses but before income taxes.

WHERE TO GO FOR MORE INFORMATION

Whether you have questions about a particular job or are trying to compare various fields, the *Occupational Outlook for College Graduates* is a good place to begin. It will answer many of your initial questions. But remember that it is only one of many sources of information about jobs and careers. After reading a few statements, you may decide that you want more detailed information about a particular occupation. You may want to find out where you can go for training, or where you can find this kind of work in your community. If you are willing to make an effort, you will discover a wealth of occupational information available at little or no cost.

Sources of Career Information

Government agencies, professional societies, trade associations, labor unions, corporations, and educational institutions put out career material that is available for the asking. Write to organizations listed in the Sources of Additional Information section at the end of every statement in the *Occupational Outlook for College Graduates* and ask for information on career opportunities. You will find the names and addresses of other organizations that publish career information in directories in your library's reference section. There are directories that list:

—trade associations.
—professional associations.
—business firms.
—junior and community colleges.
—home study and correspondence programs.
—business, trade, and technical schools.

Lists of organizations that distribute career information also may be found in directories put out by several commercial publishers.

Carefully assess any career materials you obtain. Keep in mind the date and source, in particular. Material that is too old may contain obsolete or even misleading information. Be especially cautious about accepting information on employment outlook, earnings, and training requirements if it is more than 5 years old. The source is important because it affects the content. Although some occupational materials are produced solely for the purpose of objective vocational guidance, others are produced for recruitment purposes. You should be wary of biased information, which may tend to leave out important items, overglamorize the occupation, overstate the earnings, or exxagerate the demand for workers.

Libraries, career centers, and guidance offices are important sources of career information. Thousands of books, brochures, magazines, and audiovisual materials are available on such subjects as occupations, careers, self-assessment, and job hunting. Your school library or guidance office is likely to have some of this material; ask the staff for help. Collections of occupational material also can be found in public libraries, college libraries, learning resource centers, and career counseling centers.

Begin your library search by looking in an encyclopedia under "vocations" or "careers," and then look up specific fields. The card catalog will direct you to books on particular careers, such as architect or social worker. Be sure to check the periodical section, too. You'll find trade and professional magazines and journals in specific areas such as psychology or interior design. Some magazines have classified advertising sections that list job openings. Many libraries and career centers have pamphlet files for specific occupations. Collections of occupational information may also include nonprint materials such as films, filmstrips, cassettes, tapes, and kits. Computerized occupational information systems enable users to obtain career information instantly. In addition to print and nonprint materials, most career centers and guidance offices offer individual counseling, group discussions, guest speakers, field trips, and career days.

Counselors play an important role in providing career information. Vocational testing and counseling are available in a number of places, including:

—guidance offices in high schools.
—career planning and placement offices in colleges.
—placement offices in vocational schools.
—vocational rehabilitation agencies.
—counseling services offered by community organizations, commercial firms, and professional consultants.
—Job Service offices affiliated with the U.S. Employment Service.

The reputation of a particular counseling agency should be checked with professionals in the field. As a rule, counselors will not tell you what to do. Instead, they are likely to administer interest inventories and aptitude tests; interpret the results; talk over various possibilities; and help you explore your options. Counselors are familiar with the job market and also can discuss entry requirements and costs of the schools, colleges, or training programs that offer preparation for the kind of work in which you are interested. Most important of all, a counselor can help you consider occupational information in relation to your own abilities, aspirations, and goals.

Don't overlook the importance of **personal contacts.** Talking with people is one of the best ways of learning about an occupation. Most people are glad to talk about what they do and how well they like their jobs. Have specific questions lined up; you might question workers about their personal experiences and knowledge of their field. By asking the right questions, you will find out what kind of training is really important, how workers got their first jobs as well as the one they're in now, and what they like and dislike about the work. These interviews serve several purposes: You get out into the business world, you learn about an occupation, you become familiar with interviewing, and you meet people worth contacting when you start looking for a job.

State occupational information coordinating committees have recently been established. These committees can help you find career information tailored to the job situation in your State or area. By contrast, the *Occupational Outlook for College Graduates* provides information for the Nation as a whole. The committee may provide the information directly, or refer you to other sources. In many States, it can also tell you where you can go to use the State's career information system. To find out what career materials are available, write to the director of your State occupational information coordinating committee. Following is a list of their titles and addresses:

Alabama

Director, Alabama Occupational Information Coordinating Committee, State Department of Education,
First Southern Towers, Suite 402,
100 Commerce St.,
Montgomery, Ala. 36104.

Alaska

Coordinator, Alaska Occupational Information Coordinating Committee,
Pouch F—State Office Bldg.,
Juneau, Alaska 99811.

Arizona

Executive Director, Arizona State Occupational Information Coordinating Committee,
1535 West Jefferson Ave., Room 345,
Phoenix, Ariz. 85007.

Arkansas

Director, Arkansas State Occupational Information Coordinating Committee,
P.O. Box 5162,
Little Rock, Ark. 72205.

California

Director, California Occupational Information Coordinating Committee,
800 Capitol Mall, MIC #57,
Sacramento, Calif. 95814.

Colorado

SOICC Director, Office of Occupational Information, Colorado Occupational Information Coordinating Committee,
770 Grant St.,
Room 222,
Denver, Colo. 80203.

Connecticut

Executive Director, Connecticut State Occupational Information Coordinating Committee,
Hartranft Hall,
55 Elizabeth St.,
Hartford, Conn. 06053.

Delaware

Director, State Occupational Information Coordinating Committee of Delaware,
3 Peddler's Row,
Christiana, Del. 19702.

District of Columbia

Executive Director, D.C. Occupational Information Coordinating Committee,
500 C St. NW., Suite 621,
Washington, D.C. 20001.

Florida

Director, Florida Occupational Information Coordinating Committee,
325 John Knox Rd.,
Suite L-500,
Tallahassee, Fla. 32303.

Georgia

Executive Director, State Occupational Information Coordinating Committee,
151 Ellis St., NE.,
Suite 504,
Atlanta, Ga. 30303.

Hawaii

Executive Director, Hawaii State Occupational Information Coordinating Committee,
1164 Bishop St.,
Suite 502,
Honolulu, Hawaii 96813.

Idaho

Coordinator, State Occupational Information Coordinating Committee, Len B. Jordan Bldg.,
650 W. State St.,
Boise, Idaho 83720.

Illinois

Executive Director, Illinois Occupational Information Coordinating Committee,
623 E. Adams St.,
P.O. Box 1587,
Springfield, Ill. 62705.

Indiana

SOICC Contact, Indiana Office of Manpower Development,
State Board of Vocational and Technical Education,
17 W. Market St.,
401 Illinois Bldg.,
Indianapolis, Ind. 46204.

Iowa

Executive Director, Iowa State Occupational Information Coordinating Committee,
523 E. 12th St.,
Des Moines, Iowa 50319.

Kansas

Director, Kansas Occupational Information Coordinating Committee,
Department of Human Resources,
634 S. Harrison,
Suite C,
Topeka, Kans. 66603.

Kentucky

Coordinator, Kentucky Occupational Information Coordinating Committee,
601 Versailles Rd.,
Frankfort, Ky. 40601.

Louisiana

Director, Louisiana State Occupational Information Coordinating Committee,
P.O. Box 44094,
Baton Rouge, La. 70804.

Maine

Executive Director, State Occupational Information Coordinating Committee,
State House Station 71,
Augusta, Maine 04330.

Maryland

Executive Director, Maryland Occupational Information Coordinating Committee,
Department of Human Resources,
1100 North Eutaw St.,
Baltimore, Md. 21201.

Massachusetts

Executive Director, Massachusetts Occupational Information Coordinating Committee,
Park Square Bldg.,
Suite 341,
31 St. James Ave.,
Boston, Mass. 02116.

Michigan

Executive Coordinator, Michigan Occupational Information Coordinating Committee,
309 N. Washington, P.O. Box 30015,
Lansing, Mich. 48909.

Minnesota

SOICC Director, Department of Economic Security,
690 American Center Bldg.,
150 E. Kellogg Blvd.,
St. Paul, Minn. 55101.

Mississippi

SOICC Director, Vocational Technical Education,
P.O. Box 771,
Jackson, Miss. 39205.

Missouri

Director, Missouri Occupational Information Coordinating Committee,
830d E. High St.,
Jefferson City, Mo. 65101.

Montana

Program Manager, Montana State Occupational Information Coordinating Committee,
P.O. Box 1728,
Helena, Mont. 59601.

Nebraska

Executive Director, State Occupational Information Coordinating Committee,
W. 300 Nebraska Hall,
University of Nebraska,
Lincoln, Nebr. 68588.

Nevada

Director, State Occupational Information Coordinating Committee,
Capitol Complex,
505 E. King St.,
Kinkead Bldg.,
Room 603,
Carson City, Nev. 89710.

New Hampshire

SOICC Director, Department of Employment Security,
32 S. Main St.,
Concord, N.H. 03301.

New Jersey

Acting Staff Director, New Jersey Occupational Information Coordinating Committee,
Department of Labor and Industry, Division of Planning and Research,
P.O. Box 2765,
Trenton, N.J. 08625.

New Mexico

SOICC Director, New Mexico State Occupational Information Coordinating Committee,
Executive Plaza,
4219 Montgomery Blvd. NE.,
Albuquerque, N.M. 87125.

New York

SOICC Director, State Department of Labor,
Labor Department Bldg. #12,
State Campus,
Albany, N.Y. 12240.

North Carolina

SOICC Director, North Carolina Department of Administration,
112 W. Lane St.,
Raleigh, N.C. 27611.

North Dakota

State Director, State Occupational Information Coordinating Committee,
1424 W. Century Ave.,
P.O. Box 1537,
Bismarck, N. Dak. 58501.

Ohio

SOICC Director, State Department Bldg.,
S-65 S. Front St., Room 904,
Columbus, Ohio 43215.

Oklahoma

Executive Director, State Occupational Information Coordinating Committee, School of Occupational and Adult Education, Oklahoma State University,
1515 W. 6th St.,
Stillwater, Okla. 74074.

Oregon

Executive Secretary, Oregon Occupational Information Coordinating Committee,
875 Union St. NE.,
Salem, Oreg. 97311.

Pennsylvania

SOICC Director, Pennsylvania Occupational Information Coordinating Committee,
Labor and Industry Bldg.,
7th and Forster Sts.,
Room 1008,
Harrisburg, Pa. 17121.

Puerto Rico

Executive Director, Puerto Rico Occupational Information Coordinating Committee,
414 Barbosa Ave.,
Hato Rey, P.R. 00917.

Rhode Island

Executive Director, Rhode Island Occupational Information Coordinating Committee,
22 Hayes St., Room 315,
Providence, R.I. 02908.

South Carolina

SOICC Director,
1550 Gadsden St.,
Columbia, S.C. 29202.

South Dakota

Executive Director, South Dakota Occupational Information Coordinating Committee,
108 E. Missouri,
Pierre, S. Dak. 57501.

Tennessee

Director, Tennessee Occupational Information Coordinating Committee,
512 Cordell Hull Bldg.,
Nashville, Tenn. 37219.

Texas

Executive Director, State Occupational Information Coordinating Committee, Texas Employment Commission Bldg.,
15th and Congress Ave.,
Room 648,
Austin, Tex. 78778.

Utah

Director, Occupational Information Coordinating Committee, State Board of Education,
250 E. 5th St. South,
Salt Lake City, Utah 84111.

Vermont

Director, Vermont Occupational Information Coordinating Committee,
P.O. Box 488,
Montpelier, Vt. 05602.

Virginia

SOICC Director, Vocational and Adult Education, Department of Education,
P.O. Box 6Q,
Richmond, Va. 23216.

Washington

SOICC Director, Commission for Vocational Education,
Bldg. 17,
Airdustrial Park,
Mail Stop LS-10,
Olympia, Wash. 98504.

West Virginia

Executive Director, West Virginia State Occupational Information Coordinating Committee, Capitol Complex,
1600½ Washington St., East,
Charleston, W. Va. 25305.

Wisconsin

SOICC Director, Wisconsin Occupational Information Coordinating Committee, Educational Sciences Building, Room 952,
1025 W. Johnson,
Madison, Wis. 53706.

Wyoming

Director, Wyoming Occupational Information Coordinating Committee,
1520 E. 5th St.,
Cheyenne, Wyo. 82002.

American Samoa

SOICC State Director for Vocational Education,
Government of American Samoa,
Pago Pago, American Samoa 96799.

Guam

Acting Executive Director, Guam Occupational Information Coordinating Committee, P.O. Box 2817, Agana, Guam 96910.

Northern Mariana Islands

Executive Director Northern Mariana Islands Occupational Information Coordinating Committee, P.O. Box 149, Saipan, Northern Mariana Islands 96950.

Trust Territory of the Pacific

Chairman, Trust Territory of the Pacific Islands, Occupational Information Coordinating Committee,
Office of Planning and Statistics, Saipan,
Mariana Islands 96950.

Virgin Islands

Acting Chairman, Virgin Islands Occupational Information Coordinating Committee, Department of Education,
Charlotte Amalie, St. Thomas,
Virgin Islands 00801.

Sources of Education and Training Information

As a rule, professional or trade associations can provide lists of schools that offer training in a particular field—nursing, interior design, or operations research, for example. Whenever possible, the Sources of Additional Information section at the end of every statement directs you to organizations that can provide training information. For general information, a library, career center, or guidance office may be the best place to look; all of them ordinarily have collections of catalogs, directories, and guides to educational and job training opportunities. The State career information system available in many States can also provide specific information on where to go for training in various fields. These systems are located in school guidance offices, Job Service offices, and other places. You can find out about the career information system in your State by writing to the director of the State occupational information coordinating committee at the address listed above.

A number of standard guides give pertinent information on expenses, student financial aid, admissions requirements, and courses of study at most of the Nation's **community and junior colleges and colleges and universities.** These are updated and revised frequently; be sure to use the most recent edition. Libraries and guidance offices often have collections of college catalogs as well.

Directory of Postsecondary Schools with Occupational Programs, 1978, a publication of the U.S. Department of Education's National Center for Education Statistics, lists approximately 9,500 schools that offer training after high school. The directory lists **business, trade, and technical schools** as well as community and junior colleges and colleges and universities.

Sources of Financial Aid Information

If possible, consult a high school guidance counselor or college financial aid officer for advice on sources of financial aid. Don't neglect any possibility, for many organizations offer scholarships, fellowships, grants, loans, and work-study programs. Study the many directories and guides to sources of student financial aid which are updated and revised periodically and are generally available in guidance offices and public libraries. Many career information systems also provide information on financial aid.

The Federal Government provides several kinds of financial assistance to needy students: Grants, loans, work-study, and benefits. Details are presented in a pamphlet entitled, *Student Consumer's Guide; Six Federal Financial Aid Programs, 1979–80.* This pamphlet is frequently revised; request the current edition from:

Bureau of Student Financial Assistance, Post Office Box 84, Washington, D.C. 20044.

Some student aid programs are designed to assist specific groups: Hispanics, blacks, native Americans, or women, for example. *Selected List of Postsecondary Education Opportunities for Minorities and Women,* published annually by the U.S. Department of Education, is a useful guide to organizations that offer loan, scholarship, and fellowship assist-

ance, with special emphasis on aids for minorities and women. Opportunities for financial aid are listed by fields of study, including architecture, arts and science, business, education, engineering and science, health, international affairs, journalism, law, political science and public administration, psychology, sociology, social work, speech pathology and audiology, and theology. Educational opportunities with the Armed Forces are also described. This publication can be found in many libraries and guidance offices, or may be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Price for the 1979 edition is $3.75.

Career and Counseling Information for Special Groups

Certain groups of jobseekers face special difficulties in obtaining suitable and satisfying employment. All too often, veterans, youth, handicapped persons, minorities, and women experience difficulty in the labor market. The reasons for job market disadvantages vary, of course. People may have trouble setting career goals and looking for work for reasons as different as a limited command of English, a prison record, or lack of self-confidence. Some people are held back by their background—by growing up in a setting that provided only a few role models and little exposure to the wide range of opportunities in the world of work.

A growing number of communities have career counseling, training, and placement services for people with special needs. Programs are sponsored by a variety of organizations, including churches and synagogues, nonprofit organizations, social service agencies, vocational rehabilitation agencies, and the Job Service. Some of the most successful programs provide the extensive counseling that disadvantaged job-seekers require. They begin by helping clients resolve the personal, family, or other fundamental problems that prevent them from finding a suitable job. Some agencies that serve special groups take a strong interest in their clients, and provide an array of services designed to help people find and keep jobs.

Employment counseling programs of all kinds are included in *Directory of Counseling Services,* an annual publication that lists accredited or provisional members of the International Association of Counseling Services, Inc. (IACS), an affiliate of the American Personnel and Guidance Association. The 1979–80 edition is available for $6 from IACS at Two Skyline Place, Suite 400, 5203 Leesburg Pike, Falls Church, Va. 22041.

A directory of 140 women's employment programs, entitled *The National Directory of Women's Employment Programs,* was published in 1979 by Wider Opportunities for Women, a nonprofit organization. You might look for it in a library, or it can be purchased for $7.50 plus 40 cents postage from Wider Opportunities for Women, 1649 K St., NW., Washington, D.C. 20006.

A revised edition of *Directory of Organizations Interested in the Handicapped* is scheduled for publication in 1980. The *Directory* lists more than 100 voluntary and public agencies in the rehabilitation field and briefly describes their purpose, programs, and publications. Copies of the *Directory* may be obtained from the People to People Committee for the Handicapped, 1522 K St. NW., Room 1130, Washington, D.C. 20005

Career counseling and job placement services for older workers are listed in *Finding a Job: A Resource Book for the Middle-Aged and Retired,* published in 1978 by Adelphi University. The book is out of print, but copies may be available in libraries and counseling centers.

Career materials tailored to the needs of women, handicapped workers, ex-offenders, and other special groups are generally available in counseling centers and libraries. State vocational rehabilitation agencies are an important source of career and counseling information for people with disabilities. Several agencies of the Federal Government publish pamphlets on career opportunities and job hunting techniques that may interest counselors working with special groups. Much of this material is free. Requests for career materials currently in stock may be directed to:

Youth

Office of Information, Inquiries Unit,
Employment and Training Administration,
U.S. Department of Labor, Room 10225, 601 D St. NW., Washington, D.C. 20213.

Office of Information and Consumer Affairs, Employment Standards Administration, U.S. Department of Labor, Room C-4331, 200 Constitution Ave. NW., Washington, D.C. 20210.

Minorities

Office of Information and Consumer Affairs, Employment Standards Administration, U.S. Department of Labor, Room C-4331, 200 Constitution Ave. NW., Washington, D.C. 20210.

Higher Education Scholarship Program, Division of Postsecondary Education, Bureau of Indian Affairs, U.S. Department of the Interior, 1951 Constitution Ave. NW., Washington, D.C. 20245.

Handicapped

President's Committee on Employment of the Handicapped, Room 600, Vanguard Building, 1111 20th St. NW., Washington, D.C. 20036.

President's Committee on Mental Retardation, Washington, D.C. 20201.

Office of Information and Consumer Affairs,
Employment Standards Administration,
U.S. Department of Labor, Room C-4331, 200 Constitution Ave. NW.,
Washington, D.C. 20210.

Rehabilitation Services Administration, U.S. Department of Education,
Room 1427, 330 C St. SW.,
Washington, D.C. 20201.

Office of Personnel Management, Federal Job Information Center,
P.O. Box 52, Washington, D.C. 20044.

Older Workers

Office of Information, Inquiries Unit,
Employment and Training Administration, U.S. Department of Labor, Room 10225, 601 D St. NW., Washington, D.C. 20213.

National Clearinghouse on Aging,
U.S. Department of Health and Human Services, Room 4551,
330 Independence Ave., SW.,
Washington, D.C. 20201.

Women

Women's Bureau,
U.S. Department of Labor, Room S3002,
200 Constitution Ave. NW.,
Washington, D.C. 20210.

Veterans

Office of Information, Inquiries Unit,
Employment and Training Administration,
U.S. Department of Labor, Room 10225,
601 D St. NW.,
Washington, D.C. 20213.

Office of Personnel Management,
Federal Job Information Center,
P.O. Box 52,
Washington, D.C. 20044.

Department of Veterans Benefits, 232A,
Veterans Administration Central Office,
810 Vermont Avenue, NW.,
Washington, D.C. 20420.

Federal laws, Executive Orders, and selected Federal grant programs bar discrimination in employment based on race, color, religion, sex, national origin, age, and handicap. Employers in the private and public sectors, Federal contrators, and grantees are covered by these laws. The U.S. Equal Employment Opportunity Comission is responsible for administering many of the programs that prohibit discrimination in employment. Information and inquiries about how to file a charge of discrimination should be sent to:

Equal Employment Opportunity Commission,
2401 E ST. NW., Washington, D.C. 20506.

Information on Finding a Job

Do you need help in finding a job? For information on job openings, follow up as many leads as possible. Parents, neighbors, teachers, and counselors may know of jobs. Check the want ads. Investigate your local Job Service office and find out whether private or nonprofit employment agencies in your community can help you. The following section will give you some idea of where you can go to look for a job and what sort of help to expect.

Informal job search methods. Informal methods of job search are the most popular, and also the most effective. Informal methods include direct application to employers with or without referral by friends or relatives. Jobseekers locate a potential employer and file an application, often without certain knowledge that an opening exists.

You can find targets for your informal search in several ways. The Yellow Pages and local chambers of commerce will give the

names and addresses of appropriate firms in the community where you wish to work. You can also get listings of most firms in a specific industry—banking, insurance, and newspaper publishing, for example—by consulting one of the directories on the reference shelf of your public library. Friends, relatives, and people you meet during your job search are likely to give you ideas about places where you can apply for a job.

Want ads. The "Help Wanted" ads in a major newspaper contain hundreds of job listings. As a job search tool, they have two advantages: They are cheap and easy to acquire, and they often result in successful placement. There are disadvantages as well. Want ads give a distorted view of the local labor market, for they tend to underrepresent small firms. They also tend to overrepresent certain occupations, such as clerical and sales jobs. How helpful they are will depend largely on the kind of job you seek.

Bear in mind that want ads do not provide complete information; many give little or no description of the job, working conditions, and pay. Some omit the identity of the employer. In addition, firms often run multiple listings. Some ads offer jobs in other cities (which do not help the local worker); others advertise employment agencies rather than employment.

If you use the want ads, keep the following suggestions in mind:

—Don't rely exclusively on the want ads; follow up other leads, too.

—Answer ads promptly. The opening may be filled before the ad stops running.

—Follow the ads diligently. Checking them every day as early as possible gives you the best advantage over other applicants, which may mean the difference between a job and a rejection.

—Don't expect too much from "blind ads" that do not reveal the employer's identity. Employers use blind ads to avoid being swamped with applicants, or to fill a particular vacancy quietly and confidentially. The chances of finding a job through blind ads tend to be slim.

—Be cautious about answering "no experience necessary" ads. Most employers are able to fill job openings that do not require experience without advertising in the newspaper. This type of ad may mean that the job is hard to fill because of low wages or poor working conditions, or because it is straight commission work.

Public employment service. The public employment service, also called the Job Service, is often overlooked in finding out about local job openings. Run by the State employment security agencies under the direction of the Labor Department's U.S. Employment Service, the 2,500 local Job Service offices provide help without charge. Job Service staff help jobseekers find employment and help employers find qualified workers. As its motto says, the Job Service aims to "bring people to jobs and jobs to people." To find the office nearest you, look in the State government telephone listings under "Job Service" or "Employment."

Job matching and referral. Upon entering a Job Service center, an applicant is interviewed to determine the type of work for which he or she indicates an interest and aptitude. The interviewer determines if the applicant is "job ready" or if counseling and testing services are needed. Applicants who know what kind of work they are qualified for may spend some time examining the Job Bank, a computerized listing of public and private sector job openings that is updated every day. The Job Bank is self-service; applicants examine a book or microfilm viewer and select openings that interest them. Afterwards, a Job Service staff member may describe a particular job opening in some detail and arrange for an interview with the prospective employer.

Counseling and testing. Job Service centers also help jobseekers who are uncertain about their qualifications and the kind of work they want. Most centers are staffed with a specialist who furnishes complete counseling and testing services. Counselors help jobseekers choose and prepare for an occupation based on their qualifications and interests. They aim to help individuals become aware of their job potential and then develop it. The testing program measures occupational aptitudes, clerical and literary skills, and occupational interests. Testing and counseling before job referral ensure a better match between applicant and job.

Services for veterans and youth. By law, veterans are entitled to priority in interviewing, counseling, testing, job development, and job placement. Special counselors called veterans reemployment representatives are trained to deal with the particular problems of veterans, who may find it difficult to readjust to civilian life. Although such veterans often face multiple problems, joblessness alone is a major barrier to resuming an ordinary life. Special help for disabled veterans begins with outreach units in each State, whose job it is to identify jobless disabled veterans and make them aware of the many kinds of assistance available.

To reduce excessive youth unemployment, Job Service centers test, counsel and refer young people to training programs or jobs whenever possible. Each year, local Job Service centers conduct a Summer Youth Program to provide full and part-time summer jobs for youth age 14 through 21. The program, which gives priority to disadvantaged youth, arranges for jobs in schools, libraries, community service organizations, hospitals, and private nonprofit agencies. The Job Service also refers applicants to job and training opportunities under the Comprehensive Employment and Training Act (CETA); Youth Conservation Corps (YCC); National Alliance of Business (NAB); and other Federal and community programs concentrating on youth employment.

Occupations in Demand. A monthly publication of the U.S. Employment Service entitled *Occupations in Demand* highlights occupations for which the Job Bank network reports large numbers of job openings. It also indicates which cities and areas have significant numbers of job openings. An extra edition for students and graduates, published twice a year, lists high-demand occupations for which employers usually request people with high school or postsecondary training. The extra edition also identifies hard-to-fill occupations listed with the Job Service. Copies of *Occupations in Demand* may be found in libraries and counseling centers. Or you can request single copies from:

Consumer Information Center, Pueblo, Colorado 81009.

Private employment agencies. In the appropriate section of the classified ads or the telephone book you can find numerous advertisements for private employment agencies. All are in business to make money, but some offer higher quality service and better chances of successful placement than others.

The three main places in which private agencies advertise are newspaper want ads, the Yellow Pages, and trade journals. Telephone listings give little more than the name, address, phone number, and specialty of the agency, while trade journals generally advertise openings for a particular occupation, such as accountant or computer programmer. Want ads, then, are the best source of general listings of agencies.

These listings fall into two categories—those offering specific openings and those offering general promise of employment. You should concentrate on the former and use the latter only as a last resort. With a specific opening mentioned in the ad, you have greater assurance of the agency's desire to place qualified individuals in suitable jobs.

When responding to such an ad, you may learn more about the job over the phone. If you are interested, visit the agency, fill out an application, present a resume, and talk with an interviewer. The agency will then arrange an interview with the employer if you are qualified, and perhaps suggest alternative openings if you are not.

Most agencies operate on a commission basis, with the fee contingent upon a successful match. The employer pays agencies advertising "no fees, no contracts" and the applicant pays nothing. Many agencies, however, do charge applicants. You should find out the exact cost before using the service.

Community agencies. A growing number of nonprofit organizations throughout the Nation provide counseling, career development, and job placement services. These agencies generally concentrate on services for a particular labor force group—women, the elderly,

youth, minorities, or ex-offenders, for example. Some of these agencies are listed in directories already mentioned in the section on Career and Counseling Information for Special Groups.

It's up to you to discover whether your community has such agencies and whether they can help you. The local Job Service center should be able to tell you whether such an agency has been established in your community. Your church, synagogue, or local library may have the information, too. The U.S. Department of Labor is another possible source of information, for many of these agencies receive some or all of their funding from the Federal government, through the Comprehensive Employment and Training Act (CETA). Among its many and varied provisions, CETA authorizes Federal money for local organizations that offer job counseling, training, and placement help to unemployed and disadvantaged persons. For further information, write:

Office of Comprehensive Employment Development, Employment and Training Administration, U.S. Department of Labor, Room 6000, 601 D Street, NW., Washington, D.C., 20213.

College career planning and placement offices. For those who have access to them, career planning and placement offices at colleges and universities offer the jobseeker many valuable services. Like community agencies that offer supportive services to disadvantaged jobseekers, college placement offices function as more than just employment agencies. In addition to counseling, they teach students to acquire jobseeking skills. They emphasize writing resumes and letters of application, listing possible employers, preparing for interviews, and other aspects of job search. College placement offices offer other services, too. At larger campuses they bring students and employers together by providing schedules and facilities for interviews with industry recruiters. Many offices also maintain lists of local part-time and temporary jobs, and some have files of summer openings.

Labor Market Information

All State employment security agencies develop detailed labor market data needed by employment and training specialists and educators who plan for local needs. Such information helps policymakers decide whether to expand a vocational training program, for example—or drop it altogether. Jobseekers and counselors also may find these studies helpful. Typically, State agencies publish reports that deal with future occupational supply, characteristics of the work force, changes in State and area economic activities, and the employment structure of important industries. For all States, and for nearly all Standard Metropolitan Statistical Areas (SMSA's) of 50,000 inhabitants or more, data are available that show current employment as well as estimated future needs. Each State issues a report covering current and future employment for hundreds of industries and occupations. In addition, major statistical indicators of labor market activity are released by all of the States on a monthly, quarterly, and annual basis. For information on the various labor market studies, reports, and analyses available in a specific State, contact the chief of research and analysis in the State employment security agency. Titles and addresses are as follows:

Alabama

Chief, Research and Statistics, Department of Industrial Relations,
Industrial Relations Bldg.,
649 Monroe St.,
Montgomery, Ala. 36130.

Alaska

Chief, Research and Analysis, Employment Security Division,
Department of Labor,
P.O. Box 3-7000,
Juneau, Alaska 99802.

Arizona

Chief, Labor Market Information, Research and Analysis,
Department of Economic Security,
P.O. Box 6123,
Phoenix, Ariz. 85005.

Arkansas

Chief, Research and Statistics, Employment Security Division,
P.O. Box 2981,
Little Rock, Ark. 72203.

California

Chief, Employment Data and Research Division,
Employment Development Department,
P.O. Box 1679,
Sacramento, Calif. 95808.

Colorado

Chief, Research and Analysis, Division of Employment,
Department of Labor and Employment,
1210 Sherman St.,
Denver, Colo. 80203.

Connecticut

Director, Research and Information, Connecticut Employment Security Division,
200 Folly Brook Blvd.,
Weatherfield, Conn. 06109.

Delaware

Chief, Office of Research, Planning, and Evaluation,
Department of Labor,
Bldg. D,
Chapman Rd.,
Route 273,
Newark, Del. 19713.

District of Columbia

Chief, Branch of Labor Market Information and Analysis,
D.C. Department of Labor,
605 G St. NW., Room 1000,
Washington, D.C. 20001.

Florida

Chief, Research and Statistics, Division of Employment Security,
Florida Department of Commerce,
Caldwell Bldg.,
Tallahassee, Fla. 32304.

Georgia

Director, Information Systems, Employment Security Agency,
Department of Labor,
254 Washington St. SW.,
Atlanta, Ga. 30334.

Hawaii

Chief, Research and Statistics, Department of Labor and Industrial Relations,
P.O. Box 3680,
Honolulu, Hawaii 96811.

Idaho

Chief, Research and Analysis, Department of Employment,
P.O. Box 35,
Boise, Idaho 83707.

Illinois

Manager, Research and Analysis Division, Bureau of Employment Security,
Department of Labor,
910 South Michigan Ave.,
Chicago, Ill. 60605.

Indiana

Chief of Research, Employment Security Division,
10 North Senate Ave.,
Indianapolis, Ind. 46204.

Iowa

Chief, Research and Statistics, Department of Job Service,
1000 East Grand Ave.,
Des Moines, Iowa 50319.

Kansas

Chief, Research and Analysis, Department of Human Resources,
401 Topeka Avenue,
Topeka, Kans. 66603.

Kentucky

Chief, Research and Special Projects, Department of Human Resources,
275 E. Main St.,
Frankfort, Ky. 40601.

Louisiana

Chief, Research and Statistics, Department of Employment Security,
P.O. Box 44094,
Baton Rouge, La. 70804.

Maine

Director, Manpower Research Division, Employment Security Commission,
20 Union St.,
Augusta, Maine 04330.

Maryland

Director, Research and Analysis, Department of Human Resources,
1100 North Eutaw St.,
Baltimore, Md. 21201.

Massachusetts

Director, Information and Research, Division of Employment Security,
Hurley Bldg.,
Government Center,
Boston, Mass. 02114.

Michigan

Director, Research and Statistics Division, Employment Security Commission,
Department of Labor Bldg.,
7310 Woodward Ave.,
Detroit, Mich. 48202.

Minnesota

Acting Director, Research and Statistics Services,
Department of Economic Security,
390 North Robert St.,
St. Paul, Minn. 55101.

Mississippi

Chief, Research and Statistics, Employment Security Commission,
P.O. Box 1699,
Jackson, Miss. 39205.

Missouri

Chief, Research and Statistics, Division of Employment Security,
Department of Labor and Industrial Relations,
P.O. Box 59,
Jefferson City, Mo. 65101.

Montana

Chief, Reports and Analysis, Employment Security Division,
P.O. Box 1728,
Helena, Mont. 59601.

Nebraska

Chief, Research and Statistics, Division of Employment,
Department of Labor,
P.O. Box 94600,
Lincoln, Nebr. 68509.

Nevada

Chief, Employment Security Research, Employment Security Department,
500 East Third St.,
Carson City, Nev. 89713.

New Hampshire

Director, Economic Analysis and Reports, Department of Employment Security,
32 South Main St.,
Concord, N.H. 03301.

New Jersey

Director, Division of Planning and Research, Department of Labor and Industry,
P.O. Box 2765,
Trenton, N.J. 08625.

New Mexico

Chief, Research and Statistics, Employment Security Commission,
P.O. Box 1928,
Albuquerque, N. Mex. 87103.

New York

Director, Division of Research and Statistics, Department of Labor,
State Campus,
Bldg. 1Z,
Albany, N.Y. 12240.

North Carolina

Director, Bureau of Employment Security Research, Employment Security Commission,
P.O. Box 25903,
Raleigh, N.C. 27611.

North Dakota

Chief, Research and Statistics, Employment Security Bureau,
P.O. Box 1537,
Bismarck, N.Dak. 58501.

Ohio

Director, Division of Research and Statistics, Bureau of Employment Services,
145 South Front St.,
Columbus, Ohio 43216.

Oklahoma

Chief, Research and Planning Division, Employment Security Commission,
310 Will Rogers Memorial Office Bldg.,
Oklahoma City, Okla. 73105.

Oregon

Assistant Administrator, Research and Statistics, Employment Division,
875 Union St. NE.,
Salem, Oreg. 97311.

Pennsylvania

Director, Research and Statistics, Bureau of Employment Security,
Department of Labor and Industry,
7th and Forster Sts.,
Harrisburg, Pa. 17121.

Puerto Rico

Chief of Research and Statistics, Bureau of Employment Security,
427 Barbosa Ave.,
Hato Rey, P.R. 00917.

Rhode Island

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ASSUMPTIONS AND METHODS USED IN PREPARING EMPLOYMENT PROJECTIONS

Although the discussions of future employment contained in the *Occupational Outlook for College Graduates* are written in qualitative terms, they are based on quantitative estimates developed using the most recent data available on population, industry and occupational employment, productivity, consumer expenditures, and other factors expected to affect employment. The Bureau's research offices provided much of these data, but many other agencies of the Federal Government were important contributers, including the Bureau of Apprenticeship and Training of the Department of Labor; the Bureau of the Census of the Department of Commerce; the Office of Education and the Rehabilitation Services Administration of the Department of Education; the Veterans Administration; the Office of Personal Management; the Interstate Commerce Commission; the Civil Aeronautics Board; the Federal Communications Commission; the Department of Transportation; and the National Science Foundation.

In addition, experts in industry, unions, professional societies, and trade associations furnished data and supplied information through interviews. Many of these individuals also reviewed preliminary drafts of the statements. The information presented in each statement thus reflects the knowledge and judgment not only of the Bureau of Labor Statistics staff, but also of leaders in the fields discussed. The Bureau, of course, takes full responsibility for the published material.

After the information from these sources was compiled, it was analyzed in conjunction with the Bureau's model of the economy in 1990. Like other models used in economic forecasting, the Bureau's model encompasses the major facets of the economy and represents a comprehensive view of its projected structure. It is comprised of internally consistent projections of gross national product (GNP); industrial output and productivity; labor force; average weekly hours of work; and employment for detailed industry groups and occupations. A detailed description of the model appears in *Methodology for Projections of Industry Employment,* Bulletin 2036 (forthcoming).

Assumptions. The Bureau's projections to 1990 are based on the following general assumptions.

—Inflation will decelerate to 5.2 percent annually during 1980–90.

—A stable, long-run unemployment rate close to 4.5 percent will be achieved by the mid-1980's.

—Higher energy prices will not constrain growth in GNP.

—The institutional framework of the U.S. economy will not change radically.

—Current social, technological, and scientific trends will continue.

—No major event such as widespread or long-lasting energy shortages or war will significantly alter the industrial structure of the economy or alter the rate of economic growth.

Detailed information about the assumptions used in the projections are presented in *Employment Projections for the 1980's,* BLS Bulletin 2030.

Methods. Beginning with population projections by age and sex developed by the Bureau of the Census, a projection of the total labor force is derived using expected labor force participation rates for each population group. In developing participation rates, the Bureau takes into account a variety of factors that affect decisions to enter the labor force, such as school attendance, retirement practices, and family responsibilities.

The labor force projection then is translated into the level of GNP that would be produced by a fully employed labor force. GNP is obtained by subtracting unemployment from the labor force and multiplying the result by a projection of output per worker. The estimates of future output per worker are based on an analysis of trends in productivity (output per work hour) among industries and changes in average weekly hours of work.

Next, the projection of GNP is divided among its major components: Consumer expenditures, investment, government expenditures—Federal, State, and local—and net exports. Each of these components is broken down by producing industry. Consumer expenditures, for example, are divided among industries producing goods and services such as housing, food, automobiles, medical care, and education.

Once estimates are developed for these products and services, they are translated into detailed projections of industry output, not only for the industries producing the final product—such as an automobile—but also for the industries that provide electric power, transportation, component parts and other inputs required in the production process. Input-output tables developed by the Department of Commerce and modified by the BLS are used to estimate output.

By using estimates of future output per workhour based on studies of productivity and technological trends for each industry, industry employment projections are derived from the output estimates. These projections are then compared with employment projections derived using regression analysis. This analysis develops equations that relate employment by industry to combinations of economic variables, such as population and income, that are considered determinants of long-run changes in employment. By comparing projections resulting from input-output analysis and regression analysis, areas may be identified where one method produces a projection inconsistent with trends or with the Bureau's economic model. The projections are then adjusted accordingly.

Occupational employment projections. Projections of industry employment are translated into occupational employment projections using an industry-occupation matrix. This matrix, which is divided into 200 industry sectors and 400 occupation sectors, describes the current and projected occupational structure of each industry. By applying the projected occupational structure for each industry to the industry employment projection and aggregating the resulting estimates for all industries, employment projections for each of the 400 occupations contained in the matrix are obtained. Thus, the projected employment of an occupation is determined by changes in the proportion of workers in the occupation in each industry, and the growth rate of industries in which an occupation is concentrated. For example, employment in an occupation would be projected to grow: (1) if its proportion of the work force increases but industry employment remains constant, or (2) if its proportion of the work force remains constant but industry employment increases.

In some cases, employment is related directly to one of the components of the Bureau's model—for example, the number of cosmetologists is related to consumer expenditures for beauty shop services. In others, employment is related to an independent variable not explicitly projected in the model

but believed to be a primary determinant of employment in that occupation. The projection of automobile mechanics, for example, is based on the expected stock of motor vehicles. Projections that are developed independently are compared with those in the matrix and revised, if necessary, to assure consistency.

Replacement needs. In addition to a projection of employment for each occupation, a projection is made of the number of workers who will be needed to replace those who die or retire. To estimate these replacement needs, the Bureau has developed tables of working life based on actuarial experience for deaths, and on decennial Census data for general patterns of labor force participation. Tables of working life provide death and labor force separation rates for the entire labor force, by age and sex groups. The rate for each age and sex group then is adjusted to reflect expected changes in labor force behavior. An overall separation rate for an occupation is obtained by weighting each projected rate by employment in the occupation for that age and sex group, and computing the weighted average. Average annual replacement needs are calculated by applying the projected occupational separation rate to projected employment.

The Bureau is continuing research to determine the effect of occupational transfers and temporary labor force separations on job openings. These transfers have not been taken into account in calculating replacement needs.

Job outlook for college graduates as a whole. In addition to projecting the job outlook for many occupations sought by college graduates, the Bureau has analyzed the outlook for graduates as a whole. The analysis was done by comparing projected openings in the types of jobs requiring a college degree or usually sought by graduates with estimates of the number of graduates expected to enter labor force.

Table 1 presents data on trends in the proportion of workers with 4 years of college or more in each of the nine major occupational groups.

These trends were analyzed to determine what proportion of the jobs in each major group by 1990 would require a degree or be of the type usually sought by graduates. These proportions were applied to projections of total requirements for workers in each major occupational group to obtain projections of requirements for college graduates by major occupational group, and group totals were summed. The projected growth in jobs for college graduates, therefore, reflects both the overall growth in jobs in the economy and the increasing proportion of jobs requiring graduates.

Table 1. Percent of workers in major occupational groups with 4 years of college or more, selected years, 1959–78 and projected 1990

Year	All occupational groups	Professional and technical workers	Managers and administrators	Sales workers	Clerical workers	Service workers	Craft workers	Operatives	Laborers	Farm workers
1959	10.0	56.1	13.1	10.1	4.9	1.4	2.1	0.8	0.5	1.4
1962	11.5	57.5	15.5	11.7	5.8	1.5	1.6	.9	.7	1.5
1964	11.7	59.2	16.2	10.6	5.3	1.4	1.6	1.0	.8	2.2
1965	12.0	58.8	17.7	9.8	5.5	1.3	2.1	.8	.9	1.7
1966	12.1	59.1	19.6	11.3	4.8	1.3	1.7	.6	.4	1.8
1968	12.8	59.4	20.6	10.7	4.7	1.3	1.6	.7	.7	1.2
1969	12.9	59.1	20.1	11.0	4.5	1.3	2.0	.7	.6	2.2
1970	12.8	59.8	20.1	11.8	4.7	1.3	1.8	.8	.7	1.2
1971	14.1	60.2	23.5	13.3	5.0	1.8	1.9	.9	1.6	2.3
1972	14.1	60.3	25.7	15.2	5.8	2.2	2.1	1.1	1.5	2.8
1973	14.6	62.4	26.4	15.5	5.5	2.5	2.7	1.2	1.3	4.3
1974	15.5	62.9	28.0	16.5	6.5	2.9	3.1	1.5	1.4	4.8
1975	16.7	63.8	28.5	17.2	7.6	3.1	3.3	1.7	2.2	5.1
1976	17.4	64.7	29.0	18.7	8.4	3.6	3.7	1.8	2.2	5.6
1977	17.7	65.0	31.4	19.1	8.4	3.7	3.9	1.8	2.8	6.3
1978	17.7	64.5	30.4	20.3	8.3	3.4	3.8	1.9	1.9	6.2
Projected 1990	19.0	69.3	40.9	24.6	6.5	4.0	3.1	1.5	1.4	9.7

Source Bureau of Labor Statistics

Higher proportions of graduates are projected to be needed in professional and technical, managerial and administrative, sales and farm occupations, reflecting long-term trends in the increasingly sophisticated nature of many of these jobs. The increased sophistication of management techniques, the greater amount of legislation affecting administrators, and the more advanced level of technology all should contribute to the upgrading of many jobs. Higher proportions of graduates are projected to be needed in service occupations, reflecting the upgrading of entry requirements in a few service jobs, such as police officers. To some extent, however, upgrading of jobs in these groups reflects employers' responses to the greater availability of college graduates, rather than any change in the nature of the work.

The proportions of workers in clerical and blue-collar jobs requiring a college degree were projected to be somewhat lower in 1990 than actual 1978 proportions. Employers traditionally have not sought college graduates for these kinds of jobs, and, during the 1960's when other jobs for graduates were plentiful, few graduates entered these occupations. During the 1970's, however, the proportions of graduates in these jobs increased rapidly—reflecting, for the most part, difficulty in finding more desirable jobs rather than any upgrading of job content. The projected proportions, nevertheless, are higher than those occurring during the 1960's—reflecting the greater attractiveness, and perhaps upgrading, of certain jobs in these groups such as insurance adjusters and investigators and craft workers.

Estimates of job openings over the 1978–90 period resulting from college graduates who are expected to die, retire, or leave the labor force for other reasons were calculated by applying actuarial-type data for age and sex groups to the age and sex distribution of college graduates in the labor force.

Estimates of the number of college graduates who are expected to enter the labor force were based primarily on projections of earned bachelor's degrees developed by the National Center for Education Statistics. The average number of bachelor's degrees granted annually over the 1978–90 period is expected to be slightly higher than the number granted during the 1977–78 academic year. For detailed discussion of the method used to develop these degree projections, see *Projections of Education Statistics to 1986–87,* U.S. Department of Health, Education, and Welfare, National Center for Education Statistics, NCES 78–403. Advanced degrees were not included in the calculations since virtually all advanced degree recipients would already have a bachelor's degree and, therefore, were accounted for in the bachelor's degree calculations.

The number of persons with college degrees entering the labor force over the 1978–90 period also includes some graduates with degrees earned before 1978 who are not currently in the labor force, graduates separating from the military, and immigrants with degrees. Projections of labor force entrants and re-entrants from these sources are based on historical trends.

TOMORROW'S JOBS FOR COLLEGE GRADUATES

One statement can be made about the future with absolute certainty: It will be different from today. Constant change is one of the most significant aspects of the U.S. job market. Changes in the population, the introduction of new technology or business practices, and changes in the needs and tastes of the public continually alter the economy and affect employment in all occupations. The growth of the population has spurred the need for workers to provide more housing, medical care, education, and other services and goods. The use of new technology has both created and eliminated hundreds of thousands of jobs. The computer, for example, has given birth to an entire new group of occupations—programmers, systems analysts, peripheral equipment operators—while at the same time it has decreased the need for inventory clerks, bookkeepers, and other clerical workers. Changes in the way businesses are organized and managed have had similar effects. For example, the use of centralized credit offices has reduced the need for credit managers in retail stores.

As an individual planning for a career, you must come to terms with changes that occur in the job market. Your interests and abilities will determine the occupations that attract you, but future economic and social conditions will determine the job opportunities you face. Fortunately, most factors that alter the demand for workers in occupations—shifts in population or the labor force, the introduction of technology, and the development of new organization and management techniques—generally occur over several years. By examining what has happened in the recent past, it is possible to project future requirements for workers in industries and occupations. Although no one can forecast the future with certainty, these employment projections will help you learn about future opportunities in occupations that interest you.

Individual statements of the *Occupational Outlook for College Graduates* present current trends and projections of employment for many occupations. This chapter provides a perspective for those discussions. In it you will find information about expected changes in the population and the labor force, as well as employment projections for major industrial sectors and broad occupational groups. The last part of this chapter describes the overall employment situation that college graduates are likely to face through the 1980's.

Population

Changes in population are among the basic factors that will affect employment opportunities in the future. The demand for workers in any occupation depends ultimately on the goods and services sought by the public. Changes in the size and characteristics of the population influence the amount and types of goods and services required and also affect the size and characteristics of the labor force—the people who work or are available to work. Three population trends that will affect future employment opportunities are population growth, shifts in the age structure of the population, and movement of the population within the country.

Population Growth. The population of the United States has increased throughout the century. However, the rate of growth (the size of the annual increases) was declining until the "baby boom," after World War II. During the 1960's, the rate of growth started to decline again (chart 1).

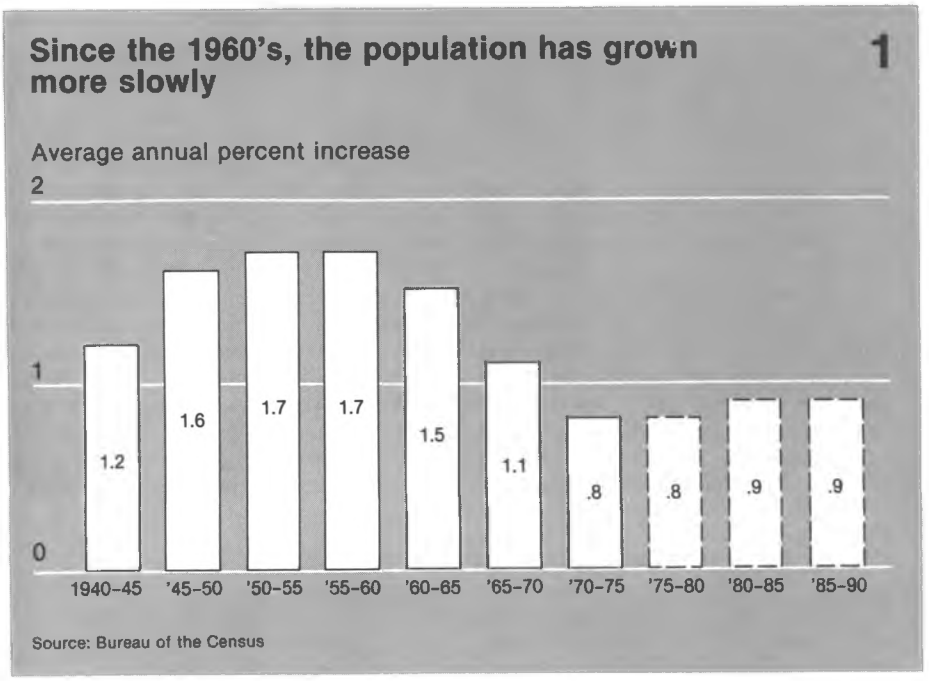
By 1990, the population is expected to increase to 244 million. This is 11 percent higher than the 1978 level of 219 million. Continued growth will mean more people to provide with goods and services causing greater demand for workers in many industries. The effects of population growth on employment in various occupations will differ. The differences are accounted for in part by the age distribution of the future population.

Age Structure. Because of the "baby boom," the proportion of young people in the population has been high in recent years. Through the 1980's, when these young adults start to enter the prime work years, the proportion of the population between the ages 25 to 44 will swell. By 1990, nearly one-third of the population will be in this age group. As a result of the relatively low number of births during the 1960's and early 1970's, the number of people between the ages of 14 and 24 will decline in the coming decade. The number of people 65 and over will grow but more slowly than in recent years. These changes in the age structure of the population will directly affect the types of goods and services demanded. For example, as the number of young people declines, the need for education services will fall. When greater numbers of people from the baby boom establish families, they will require more housing and goods such as appliances.

Shifts in the age structure of the population also will affect the composition of the labor force. These effects are discussed in a later section.

Regional Differences. National trends in population may not be the same as changes in a particular region or locality. A nation as large and diversified as the United States is bound to vary geographically in the rate of the population growth. For example, between 1970 and 1975, the average annual rate

Since the 1960's, the population has grown more slowly 1

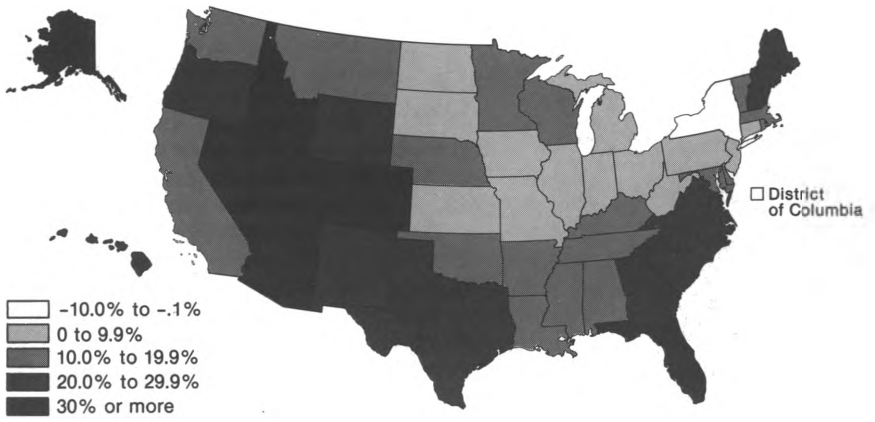


Source: Bureau of the Census

Because of interstate migration, change in population will vary among States

2

Percent change in population, 1975 to 1990

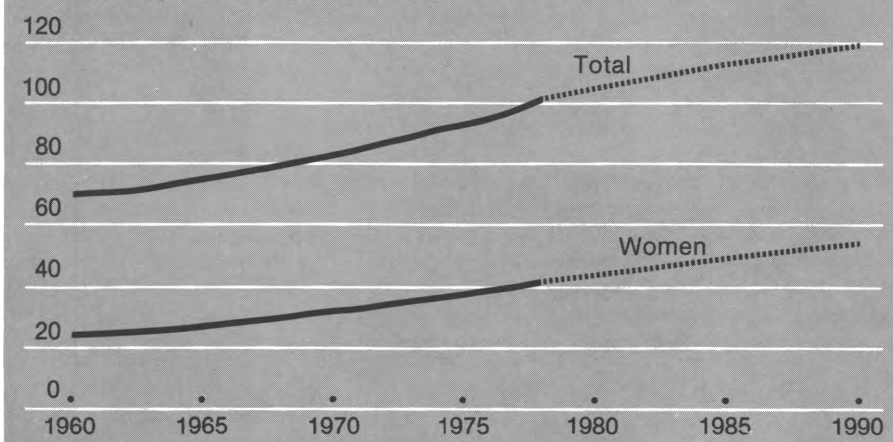


Source: Bureau of the Census

Although labor force growth will slow during the 1980's, the proportion of women will increase

3

Persons 16 years and over (millions)



Source: Bureau of Labor Statistics

of population change in the Northeast and North Central regions averaged .2 percent and .4 percent compared with 1.5 percent and 1.6 percent for the South and West. These trends reflect the movement of people between states—to find new jobs, to retire, or for some other reason.

Chart 2 shows the projected trends in population growth among the states between 1975 and 1990 that will occur if the movement of people in the next decade is similar to that from 1970 to 1975. The population shift to the South and West will result in over half the population living in these areas by 1990.

Such geographic shifts in the population will alter the demand for and supply of workers in local job markets. In areas with growing populations for example, demand for services such as police and fire protection, water and sanitation will increase. At the same time more people looking for work in those areas could increase competition in some occupations. Individuals investigating future employment opportunities in an occupation should remember that local conditions could differ greatly from national projections presented in the *Occupational Outlook for College Graduates.* Sources of information about local job market conditions can be found in the chapter, "Where to Go for More Information."

Labor Force

The size and characteristics of the labor force determine the number and type of people competing for jobs in the various occupations. In addition, because workers are a vital part of the production process, the size of the labor force limits the amount of goods and services that can be produced. Growth, alterations in the age structure, and rising educational levels are among the labor force changes that will affect employment opportunities through the 1980's.

Growth. The civilian labor force consists of people with jobs—wage and salary workers, self-employed workers, and unpaid family workers—and people looking for jobs—the unemployed. Through the late 1960's and the 1970's the number of people in the labor force grew tremendously because many people born during the "baby boom" entered the job market, and more women sought jobs. In 1978, the civilian labor force totaled about 100 million persons—63.2 percent of the noninstitutional population 16 years of age and over.

The labor force will continue to grow during the 1980's but at a slower rate than in recent years. By 1990 about 119 million persons will be in the labor force—an 18.5 percent increase over the 1978 level. Contributing to this growth will be the expansion of the working age population and the continued rise in the proportion of women who work. The labor force will grow more slowly between 1985 and 1990 than in the early 1980's. This slowdown will result from a drop in the number of young people entering the working age and less rapid growth of the participation rate of women (Chart 3).

A larger labor force will mean more people looking for jobs. However, because of shifts in the age structure, the employment outlook for many individuals will improve.

Age Structure. As a result of the large number of young people who have entered the labor force in recent years, competition for many entry level jobs has been stiff and many young workers have been unemployed. As the number of people between 16 and 24 —the ages when most people first enter the labor force—drops, competition for entry level jobs should ease. The 24 to 44 year old age group, those born during the "baby boom", will find jobs and gain work experience. The whole economy should benefit since experienced workers generally are more productive and less likely to be unemployed. (Chart 4).

Education. Employers always wish to hire the best qualified persons available. This does not mean that they always choose those applicants who have the most education. However, individuals looking for a job should be aware that the higher educational attainment of the labor force as a whole could increase competition in many occupations.

Persons considering attending college should recognize that a college education has become more widespread. The proportion of workers in the labor force who have completed at least 4 years of college has risen from 8 to nearly 18 percent between 1952 and 1978. The concluding section of this chapter

contains a discussion of the job prospects for college graduates.

Employment

The previous sections discussed trends in the population and the labor force—two factors which affect employment opportunities. Other factors include the policies of the Federal government, the inflation rate, and the availability of energy. The following sections present estimates of 1990 employment in major industries and occupational groups; also included are discussions of the reasons for changes in the level of employment.

Changes in the population and the labor force and other factors determine the amount and type of goods and services that will be demanded in the future. If the demand for an industry's product increases in the future, more workers generally will be hired to increase production, and employment in the industry will grow. Changes in occupational employment will result from growth in the industries that employ these workers. Every industry group has a unique mix of workers. Construction, for example, employs mostly blue-collar workers, while finance, insurance, and real estate is predominately a white-collar industry group. (Chart 5). Growth in the construction industry would result in an increase in employment of blue-collar workers, as would growth in mining, manufacturing or transportation—industries that also employ high proportions of blue-collar workers. Growth in the finance, insurance, and real estate industries would result in an increase in demand for white-collar workers.

The estimates of employment growth in the following section are based on a model of the U.S. economy prepared by the Bureau of Labor Statistics. The model assumes, for the next decade, a moderately expanding labor force, a relatively slow decline in inflation, and moderate growth of government expenditures.

The Bureau also has prepared a high employment alternative model which assumes the Federal Government will seek to lower the unemployment rate rapidly by increasing grants to State and local governments. Because of government efforts to reduce unemployment, the model also assumes a faster rate of growth for the labor force. Under these assumptions, employment in 1990 would be higher than estimated below for virtually every industry. A discussion of the assumptions and methods used to develop the two models can be found in a separate chapter of the *Occupational Outlook for College Graduates* and a more detailed explanation is given in *Employment Projections for the 1980's,* BLS Bulletin 2030.

Industrial Profile

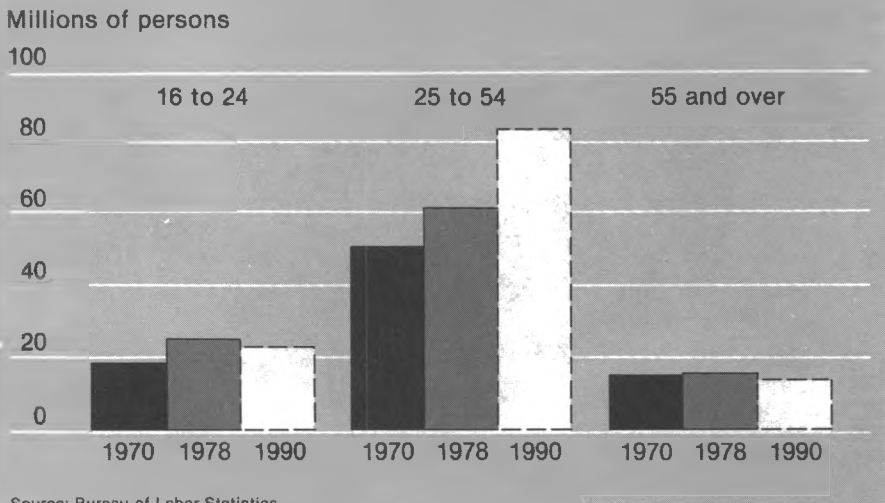
To discuss employment trends and projections in industries, it is useful to divide the economy into nine industrial sectors under two broad groups—service-producing industries and goods-producing industries. (Chart 6). Over two-thirds of the Nation's workers —including 4 out 5 employed college graduates—currently are employed in industries that provide services such as health care, trade, education, repair and maintenance, government, transportation, banking, and insurance. Industries that produce goods through farming, construction, mining, and manufacturing employ less than one-third of the country's work force.

Service Producing-Industries. As shown in chart 7, employment in service-producing industries has been increasing at a faster rate than employment in goods-producing industries. Among the factors that have contributed to this rapid growth are rising incomes and living standards that result in greater demand for schooling, health care, entertainment, and financial services. In addition, the growth of cities and suburbs brought a need for more local government services. Further, because many services involve personal contact, people are less likely to be replaced by machines in service-producing industries.

In 1978, about 1 out of 5 workers in service-producing industries, nearly 12.7 million, were college graduates.

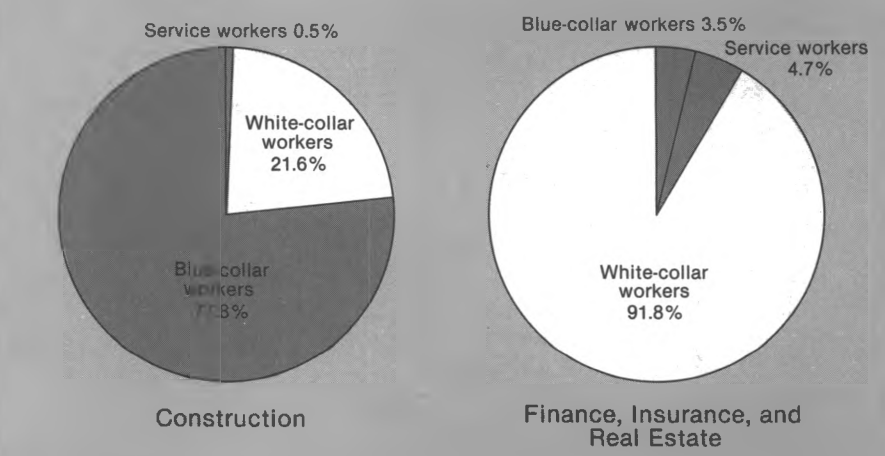
Employment in the service-producing industries is expected to increase from 60.4 million workers in 1978 to 78.4 million in 1990 or about 30 percent. Growth will vary among industries within the group. (Chart 8). The following paragraphs summarize recent trends and the projections of employment in the five industrial sectors that make up the service-producing industries.

Through the 1980's, the number of workers in the prime working ages will grow dramatically 4



Source: Bureau of Labor Statistics

Industries differ substantially in the kinds of workers they employ 5



Source: Bureau of Labor Statistics

Transportation and public utilities. This is the slowest growing sector of the service-producing industries. Between 1965 and 1978, employment in this sector increased only half as fast as in the service-producing industries as a whole due largely to declining employment requirements in the railroad and water transportation industries. However, even in the communications industries where demand increased greatly, technological innovations limited employment growth.

In 1978, only about 3 percent of employed college graduates worked in the transportation and public utilities industries. College graduates comprised less than 10 percent of the workers in these industries.

Between 1978 and 1990, employment in the transportation and public utility sector is expected to rise from 4.9 to 5.4 million workers or 10 percent. Communications industries will grow the fastest of the industries in the sector, about 17 percent, from 1.2 to 1.4 million workers. Improvements in communications equipment which have minimized the cost for such services and greatly increased the demand, will keep employment from growing as rapidly as output.

Although employment in railroad and water transportation industries is expected to decline (but at a slower rate than before), other transportation industries such as air, local transit, and trucking will increase. Employment in transportation as a whole will rise about 7 percent from 2.9 to 3.1 million workers.

The demand for electric power, gas utilities, and water and sanitary services will increase through the 1990's as the population grows and more households are formed. Technological innovation in the systems used to provide these services will limit employment growth to about 8 percent from 780,000 workers in 1978 to 840,000 workers in 1990.

Trade. Both wholesale and retail trade employment have increased as the population has grown and as rising incomes have enabled people to buy a greater number and variety of goods. Retail trade has grown more than wholesale trade; the expansion of the suburbs has created a demand for more shopping centers. Between 1978 and 1990, wholesale and retail trade employment is expected to grow from 19.4 to 24.8 million workers or about 28 percent. Employment will continue to increase faster in retail trade than in wholesale trade, 34 percent compared to 8 percent. Employment will rise despite the use of some laborsaving innovations such as self-service merchandizing and computerized checkout systems. Some of the employment growth in retail trade will result from part-time workers replacing full-time workers.

In 1978, almost 12 percent of employed college graduates, roughly 1.8 million, worked in trade. They comprised over 9 percent of all workers in trade.

Finance, insurance, and real estate. This sector grew 57 percent between 1965 and 1978 as these industries expanded to meet the financial and banking demands of a growing population. Within the sector, the two fastest growing industries have been banking and credit. Employment requirements have increased as banks provide more services, such as bank credit cards, and remain open longer hours.

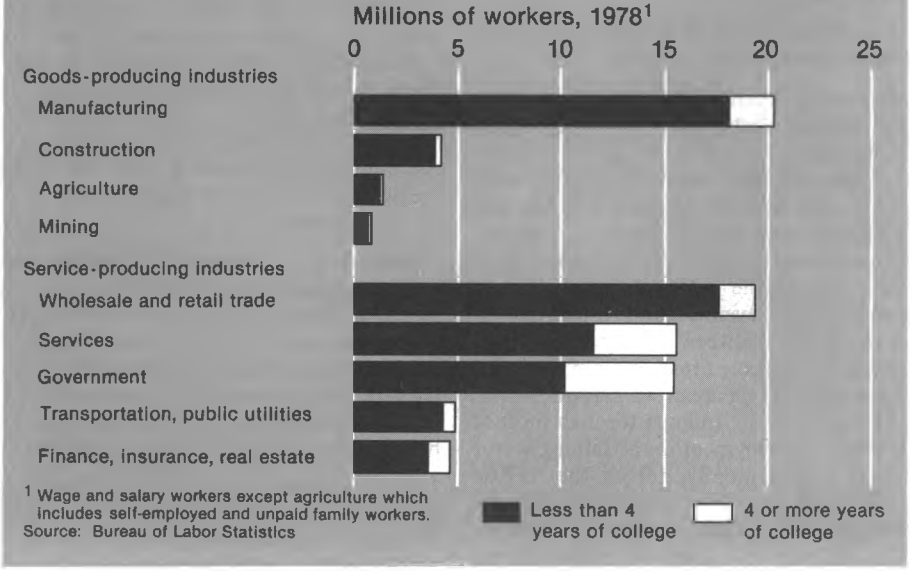
About 7 percent of employed college graduates in 1978 worked in finance, insurance, and real estate. Of all workers in these industries in 1978, 23 percent were college graduates.

Between 1978 and 1990, employment in this sector is expected to rise from 4.7 to 6.3 million workers or 34 percent. A growing population that increasingly uses credit to finance purchases will keep the consumer demand for credit and other financial services high. In addition, businesses will need assistance to finance the expansion of their plants and the purchase of new equipment.

Services. This sector includes a variety of industries, such as hotels, barber shops, automobile repair shops, business services, hospitals, and nonprofit organizations. Employment in this sector has grown faster than any other in the service-producing group, increasing 77 percent between 1965 and 1978. High demand for health care, maintenance and repair, advertising, and commercial cleaning services have been among the forces behind this growth.

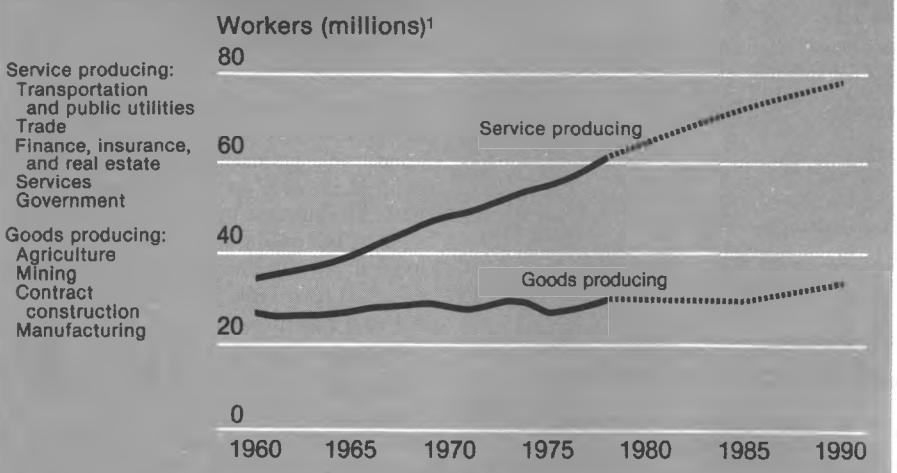
In 1978, 26 percent of all employed college graduates, almost 4 million, worked in the service industries. About 1 out 4 service workers were college graduates.

Where people work 6



[1] Wage and salary workers except agriculture which includes self-employed and unpaid family workers.
Source: Bureau of Labor Statistics

Industries providing services will continue to employ more people than those providing goods 7



[1]Wage and salary workers, except for agriculture, which includes self-employed and unpaid family workers.
Source: Bureau of Labor Statistics

From 1978 to 1990, employment in the service industries is expected to increase from 16 to 24.4 million workers or 53 percent, nearly twice the rate of the service-producing industries as a whole. Employment requirements in health care are expected to grow rapidly due to population growth—particularly the elderly—and rising incomes that increase people's ability to pay for medical care. Business services, including accounting, data processing, and maintenance, also are expected to grow rapidly.

Government. Increased demand for services provided by the government—education, health and welfare, and police and fire protection caused employment in the government sector to rise about 54 percent between 1965 and 1978. Employment in State and local governments expanded 65 percent compared to 16 percent for the Federal Government.

School enrollments are expected to decline through the 1980's as a result of low births rates in the 1960's and 1970's. Consequently, State and local governments will cut employment in schools. New government programs to offset these cuts are unlikely because of the public's desire to limit government growth. As a result, between 1978 and 1990, government employment is expected to rise only 13 percent, from 15.5 to 17.5 million workers.

Government employs more college graduates than any other sector. In 1978, 1 out 3 employed college graduates, over 5.3 million, worked in government. More than 60 percent of them were employed in State and local education. College graduates comprised 34 percent of all government workers in 1978.

Goods-Producing Industries. Employment in the goods-producing industries rose only 9 percent between 1965 and 1978. Significant gains in productivity resulting from automated production, improved machinery, and other technological breakthroughs permitted large increases in output without additional workers.

In 1978, about 18 percent of all employed college graduates, about 2.8 million, worked in goods-producing industries. About 1 out of 10 workers employed in these sectors in 1978 was a college graduate. Between 1978 and 1990, employment in goods-producing industries is expected to increase from 28.7 to 32.5 million workers or about 13 percent. Growth rates will vary among the four sectors—agriculture, mining, construction, and manufacturing.

Agriculture. Employment in agriculture which has long been declining dropped nearly 23 percent between 1965 and 1978. At the same time output of farms has been increasing through the use of more and better machinery, fertilizers, feeds, pesticides, and hybrid plants.

About 8 percent of all agricultural workers were college graduates in 1978.

Domestic demand for food will increase only slightly faster than the population through the 1980's. The worldwide demand for food will rise because of population growth, and exports of food will increase through the next decade. Farm productivity will continue to improve—although more slowly than in the past—and production is expected to rise even as employment continues to decline. Between 1978 and 1990, employment is projected to drop from 3.3 to 2.9 million workers or about 12 percent.

Mining. Having declined through most of the 1960's, employment in the mining sector increased substantially during the 1970's. Employment rose about 32 percent between 1965 and 1978, mostly because of the country's need for oil, coal, and other energy sources.

Of all workers in mining in 1978, about 14 percent were college graduates.

As the development of fuel sources continues through the next decade, employment in the mining sector is expected to grow from 830,000 to 1 million workers or about 20 percent. In some nonenergy industries such as iron ore mining, employment will remain the same because of improvements in mining techniques.

Contract construction. Employment grew during the 1960's because of high demand for houses, apartments, office buildings, and highways. The slowdown of the economy during the early 1970's limited employment growth in the construction industries during most of the decade. However, employment has increased greatly in the last few years due to a strong demand for new housing.

In 1978, over 7 percent of all workers in construction were college graduates.

During the early 1980's, the demand for new housing will remain high because the number of households is expected to increase. Business expansion and maintenance of existing buildings also will require more construction. Between 1978 and 1990, employment in the construction sector is expected to increase from 4.2 to 4.9 million workers or about 17 percent.

Manufacturing. Although a growing population and rising incomes have increased demand for almost all types of goods, improved production methods have limited employment growth in many manufacturing industries. In fact, employment grew more slowly in manufacturing than in any other sector between 1965 and 1978, only 13 percent.

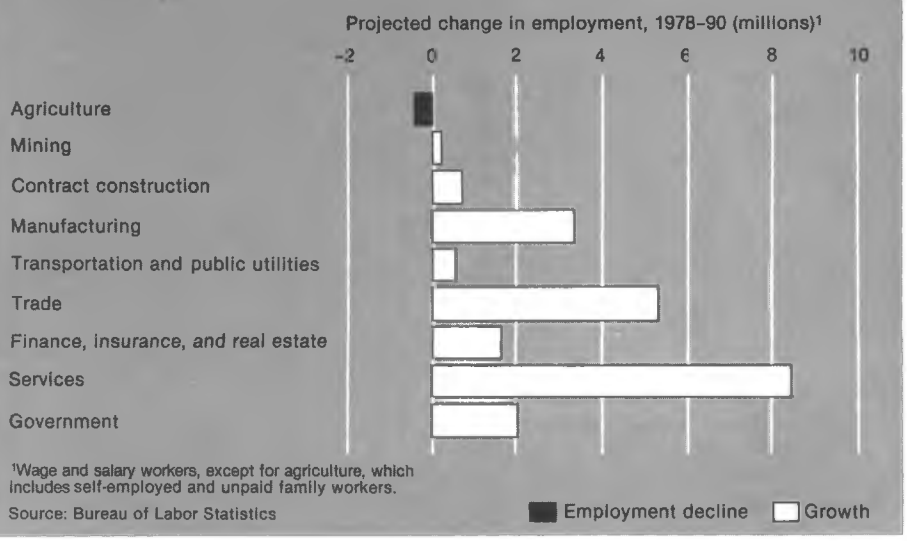
In 1978, about 1 out of 7 employed college graduates worked in manufacturing. Of all workers in manufacturing in 1978, about 11 percent were college graduates.

Manufacturing employment is expected to rise to 23.6 million workers by 1990, a 16 percent increase from the 1978 level of 20.3 million workers. Demand for consumer goods is expected to rise because of increasing incomes. Demand for capital goods such as machinery also should rise as businesses expand their plants and foreign countries increase imports.

Manufacturing is divided into two broad categories, durable goods manufacturing and nondurable goods manufacturing. Employment in durable goods manufacturing is expected to increase by about 19 percent, from 12.2 to 14.5 million workers, while employment in nondurable goods manufacturing is expected to increase by only 11 percent, from 8.2 to 9.1 million workers.

Growth rates will vary among individual industries within each of these categories. In nondurable goods industries, for example, employment in bakeries is expected to decline, while a moderate rise in employment is projected for the paper industry. Among durable goods industries, computers and peripheral equipment are expected to undergo a

Through the 1980's, changes in employment will vary widely among industries 8



[1]Wage and salary workers, except for agriculture, which includes self-employed and unpaid family workers.

Source: Bureau of Labor Statistics

rapid employment increase; iron and steel manufacturing will employ about the same number of workers in 1990 as in 1978. (Chart 9).

Occupational Profile

Customarily, occupations are divided into white-collar occupations—professional and technical, clerical, sales, and managerial jobs; blue-collar occupations—craft, operative, and laborer jobs; service occupations; and farm occupations.

Growth rates among these groups have differed markedly, as shown in chart 10. Once a small proportion of the total labor force, white-collar workers now represent about half of the total. The number of service workers also has risen rapidly, while the blue-collar work force has grown only slowly and farm workers have declined. The following section describes expected changes among the broad occupational groups between 1978 and 1990. (Chart 11). **White-collar workers,** who numbered 47.2 million in 1978, included more than 9 out of every 10 employed college graduates. (Chart 12). More than 31 percent, or 14.9 million, of all white-collar jobs were filled by college graduates in 1978. By 1990, 34 percent, or nearly 20 million, of the 58.4 million white-collar jobs are expected to require a college degree. Although employment requirements for college graduates are expected to increase by 34 percent, requirements in some white-collar occupations will vary greatly.

Professional and technical workers. This category includes many highly trained workers, such as scientists and engineers, medical practitioners, teachers, entertainers, pilots, and accountants. In 1978, 65 percent of the workers in this group were college graduates. (Chart 13). Nearly 4 out of 7 employed college graduates were professional and technical workers in 1978. Between 1978 and 1990, employment in this group is expected to grow from 14.2 to 16.9 million workers or about 19 percent. Requirements for college graduates are expected to increase by about 27 percent, from 9.2 million to 11.7 million.

Greater efforts in energy production, transportation, and environmental protection will contribute to a growing demand for scientists, engineers, and technicians. The medical professions can be expected to grow as the health services industry expands. The demand for professional workers to further develop and utilize computer resources also is projected to grow.

Some occupations in this group will offer less favorable jobs prospects, in many cases because the supply of workers will exceed openings. Teachers will continue to face competition, as will artists and entertainers, airline pilots, and oceanographers.

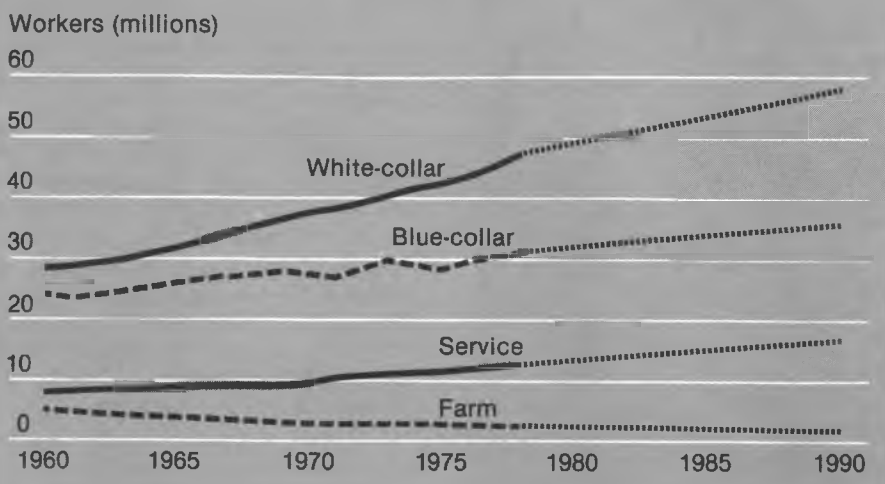
Managers and administrators. This group includes workers such as bank officers and managers, buyers, credit managers, and self-employed business operators. In 1978, 30 percent of the workers in this group were college graduates. Nearly 1 out of 5 employed graduates worked as managers and administrators in 1978. Between 1978 and 1990, this group is expected to grow from 10.1 to 12.2 million or 21 percent. Requirements for college graduates are expected to increase by 62 percent, from 3.1 million to 5.0 million.

Changes in business size and organization have resulted in differing trends for self-employed and salaried managers. The number of self-employed business managers will continue to decline as large corporations and chain operations increasingly dominate many areas of business. Some small businesses, such as quick-service groceries and fast-food restaurants, still will provide opportunities for self-employment, however. The demand for salaried managers will continue to grow as firms increasingly depend on trained management specialists, particularly in highly technical areas of operation.

Clerical workers. This group constitutes the largest occupational group and includes bank tellers, bookkeepers, cashiers, secretaries, and typists. Although few clerical jobs require a college degree, in 1978, more than 8 percent of all clerical workers, about 1.4 million, were college graduates. About 1 out of 12 employed college graduates held clerical jobs in 1978.

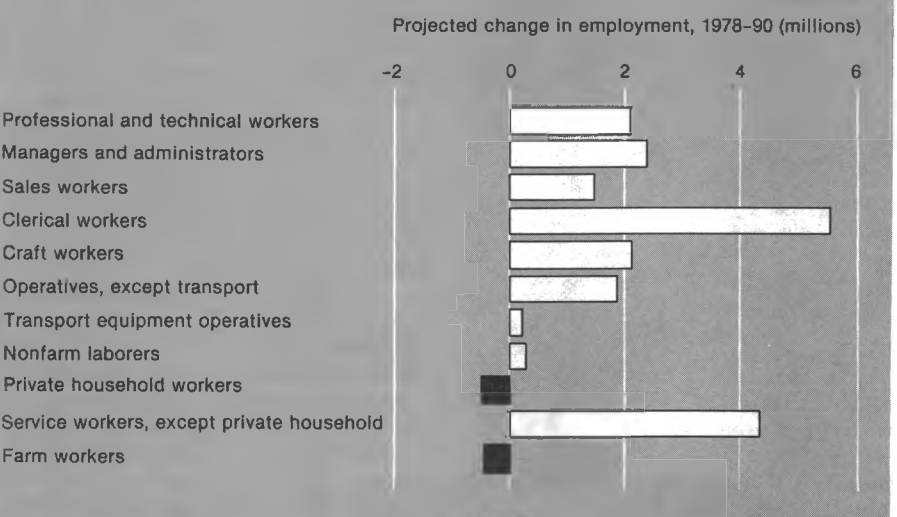
Between 1978 and 1990, employment of clerical workers is expected to grow from 16.9 to 21.7 million workers or 28 percent. The proportion of clerical jobs that will require a college degree is not expected to increase through the 1980's, since no developments are forseen that are likely to cause the educational requirements to be upgraded for

White-collar workers will continue to be the largest occupational group 9



Source: Bureau of Labor Statistics

Through the 1980's, changes in employment will vary widely among occupational groups 10



Source: Bureau of Labor Statistics

significant numbers of clerical jobs. More college graduates could find employment in clerical positions that will not require a college degree, however.

New developments in computers, office machines, and dictating equipment will greatly affect employment in many occupations within this group. As computers are used more extensively to store information and perform billing, payroll, and other calculations, employment of file clerks and many types of office machine operators will level off or decline. At the same time, however, the need for computer and peripheral equipment operators will increase. Dictation machines, which have sharply reduced the need for stenographers, will continue to adversely affect employment prospects for workers in that occupation.

However, technological innovations will not affect many clerical workers whose jobs involve a high degree of personal contact. Substantial opportunities, for example, are anticipated for secretaries, and receptionists.

Sales workers. These workers are employed primarily by retail stores, manufacturing and wholesale firms, insurance companies, and real estate agencies. In 1978, less than 1 employed college graduate in 12 was in this group. About 20 percent of the sales workers were college graduates in 1978. College graduates employed in sales jobs are concentrated in industries other than retail trade —in occupations such as insurance agents, manufacturers sales representatives, and securities sales workers, which employers generally prefer to fill with college graduates.

Employment of sales workers is expected to grow from 6.0 to 7.6 million workers between 1978 and 1990, an increase of 27 percent. Requirements for college graduates in this group are expected to increase by 55 percent, from 1.2 million to almost 1.8 million.

Much of this growth will be due to expansion in the retail trade industry, which employs nearly one-half of these workers. The demand for both full- and part-time sales workers in retail trade is expected to increase as the growing population requires more shopping centers and stores. Despite the use of laborsaving merchandizing techniques such as computerized checkout counters, more stores and longer operating hours will cause employment to increase.

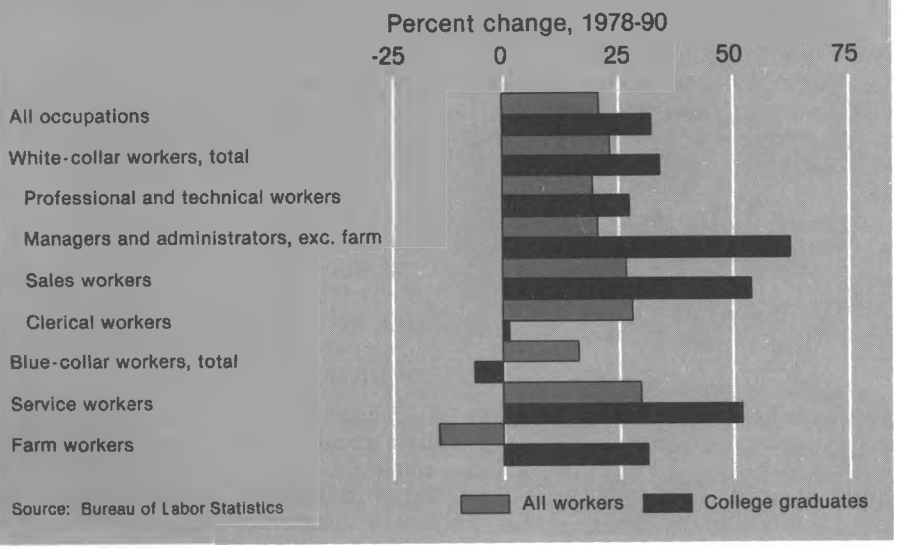
Blue-collar workers. Persons employed in craft, operative, and nonfarm laborer jobs are called blue-collar workers. *Craft workers* include a wide variety of highly skilled workers, such as carpenters, tool-and-die makers, instrument makers, allround machinists, electricians, and automobile mechanics. *Operatives* are the largest blue-collar group, including workers such as assemblers, packers, truck and bus drivers, and many types of machine operators. *Nonfarm laborers* include workers such as garbage collectors, construction laborers, freight and stock handlers, and equipment washers. In 1978, about 5 percent of employed college graduates were in blue-collar jobs, many in positions that do not require a college degree.

Employment of blue-collar workers is expected to grow by about 16 percent between 1978 and 1990, rising from 31.5 million to 36.6 million workers. Employment requirements for college graduates in these occupations are not expected to increase.

Service workers include private household service workers, such as housekeepers, child care workers, and caretakers, and a wide range of other workers—firefighters, cosmetologists, and bartenders are a few examples. These workers, most of whom are employed in the service-producing industries, make up the fastest growing occupational group. In 1978, less than 3 percent of employed college graduates were in service jobs. More than 3 percent of all service workers, over 430,000, were college graduates. Many college graduates were employed in positions that do not require a college degree.

Although employment of private household service workers is expected to decline between 1978 and 1990, total employment of service workers is expected to increase nearly 30 percent from 12.8 million to 16.7 million workers. Employment of private household service workers is expected to decline despite a rising demand for their services because the low wages and the strenuous nature of the work make these occupations unattractive to many people. Factors expected to increase the need for other types of service workers are the rising demand for commercial cleaning services and protective services; and—as incomes rise—more frequent use of restaurants, beauty salons, and leisure services. Between 1978 and 1990, requirements for col-

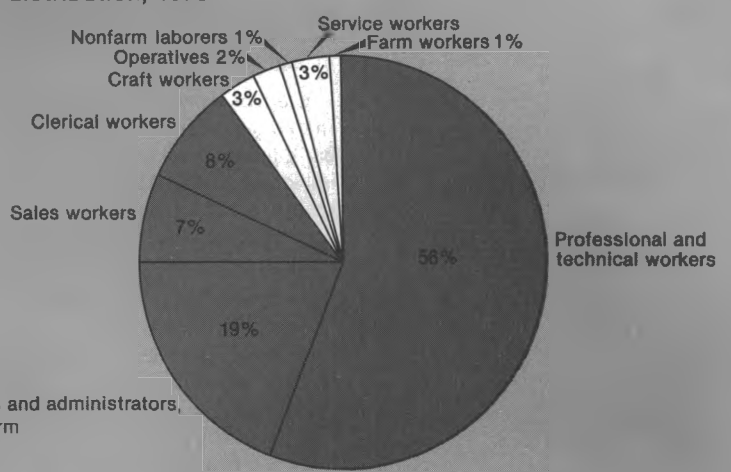
Requirements for college graduates are expected to grow faster than requirements for all workers 11



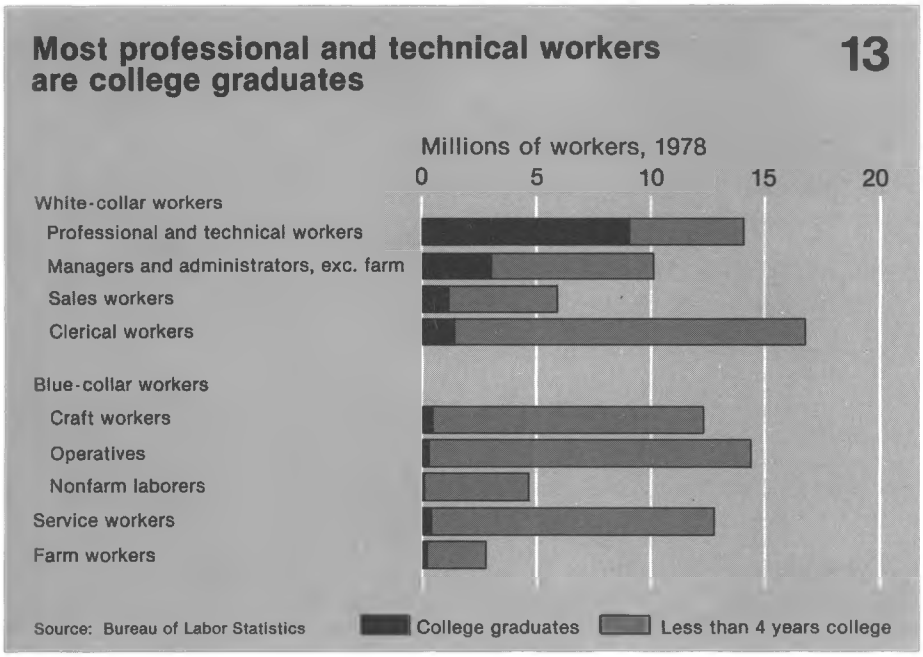
Source: Bureau of Labor Statistics

Most college graduates work in white-collar jobs 12

Percent distribution, 1978



Source: Bureau of Labor Statistics



lege graduates in service jobs are expected to increase by more than 50 percent, reflecting the upgrading of entry requirements in a few service occupations, such as police officers. Nevertheless, by 1990 only about 1 service job out of 25 is expected to require a college degree.

Farm workers This group includes farmers and farm operators as well as farm laborers. About 1 percent of employed college graduates in 1978 were farm workers. Employment of these workers has declined for decades as farm productivity has increased as a result of fewer but larger farms, the use of more and better machinery, and the development of new feeds, fertilizers, and pesticides. Between 1978 and 1990, the number of farmworkers is expected to decline from 2.8 million to 2.4 million workers or 14 percent. Requirements for college graduates in farm work are expected to increase, however, as agricultural technology and farm management become more complex.

Job Openings

Projected size and change in employment are two indicators of future job prospects; another is the total number of job openings expected in the occupation. The total includes job openings resulting from employment growth and the need to replace employees in an occupation who die, retire, transfer to another occupation, or simply stop working, perhaps to attend college or care for a family.

Between 1978 and 1990, replacement needs from deaths and retirements are expected to be twice those from employment growth. Although data are not available to estimate other replacement needs, research findings indicate occupational transfers and temporary labor force separations are a larger source of job openings than growth, deaths, and retirements combined.

The relationship of replacement needs to employment in an occupation is complex and not completely understood. However, limited information indicates that some occupations will offer more job opportunities than their projected employment or growth rates would suggest.

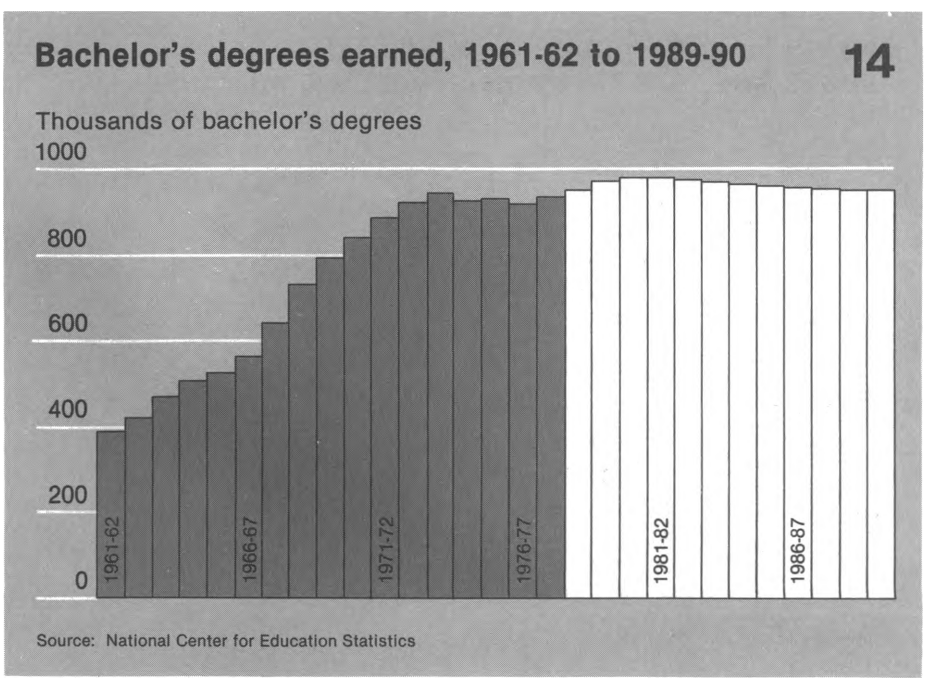
Generally speaking, employees in occupations requiring the least training or experience—such as many operative, clerical, service, and sales occupations—have a higher replacement rate than other occupations. These workers can quit and later easily find a similar job. On the other hand, occupations requiring the most training or experience—such as professional and managerial occupations—tend to have the lowest replacement rates. Architects and physicians, for example, have extensive training and there are few occupations to which they could transfer without taking a cut in pay.

Unfortunately, projected data about total replacements needs are not available. However, the patterns of the past are unlikely to change significantly: Occupations which require little training will provide more employment opportunities from replacement needs than occupations which require extensive training or experience.

When reviewing the employment projections, keep in mind replacement needs. Because of job transfers, deaths, retirements, and other labor force separations, employment opportunities may exist even in occupations where employment is expected to decline or to increase slowly.

College Graduates: Demand and Supply, 1978–90

Throughout most of the 1960's, a college degree was considered almost a guarantee of a good job. Overall, there probably were more jobs for which employers sought graduates than there were graduates to fill them. Consequently, graduates generally had their pick of jobs and almost all graduates found the kinds of jobs they sought. The job market for college graduates, however, changed dramatically beginning about 1969, and since then, graduates have faced increased competition for the kinds of jobs they wanted. The slowdown in the Nation's economic growth during the early and mid-1970's and a drop in the need for new teachers contributed, in part, to this turnaround. However, the principal reason for the competition faced by college graduates has been the sharp increase in the number of graduates seeking jobs. This increase has come about because of sharp increases in the number of bachelor's degrees granted (chart 14), as well as because higher proportions of college graduates are seeking jobs. For example, between March 1966 and



March 1978, the proportion of all college graduates age 25 to 34 not in military service who were employed or looking for work increased from 79 to 86.5 percent.

Approximately twice as many college graduates entered the labor market each year —on average—between 1969 and 1978 as entered during the 1962–69 period. Because job openings in the occupations which graduates traditionally sought were not available in sufficient numbers, more and more graduates entered nontraditional areas. Chart 15 compares the kinds of jobs graduates entered between 1962 and 1969 with those they entered between 1969 and 1978.

Of the roughly 575,000 graduates who entered the labor force annually—on average—between 1962 and 1969, about 73 percent entered professional and technical occupations. This group includes accountants, engineers, doctors, lawyers, teachers, and other occupations for which a college degree usually is required. About 17 percent entered managerial and administrative occupations, another major occupational area generally felt by graduates to be appropriate to their education and abilities. Another 3 percent entered sales jobs, most probably in the better paying sales jobs such as securities sales workers and manufacturers' sales representatives. Less than 6 percent entered clerical, blue-collar, service, and farm occupations.

A different pattern emerged for the 1,150,000 college graduates who entered the labor force annually—on average—between 1969 and 1978. (Chart 15). Although more graduates entered professional and technical occupations than during the previous period, the percentage finding professional and technical jobs was much smaller—only 45 percent—because many more graduates were competing for available positions. About 20 percent entered managerial jobs and another 8 percent entered sales jobs. It is estimated that about one-fourth of the graduates spilled over into occupations not previously sought or filled by college graduates, or were unemployed. Most were clerical, blue-collar, service, and farm occupations, but some were managerial and sales occupations. Some of the increase in the proportion entering managerial and sales jobs probably represents upgrading, which occurs as jobs become more complex and require people who have more education. The great majority of graduates who took clerical, service, and blue-collar jobs over the 1969–78 period, however, did not enter upgraded positions.

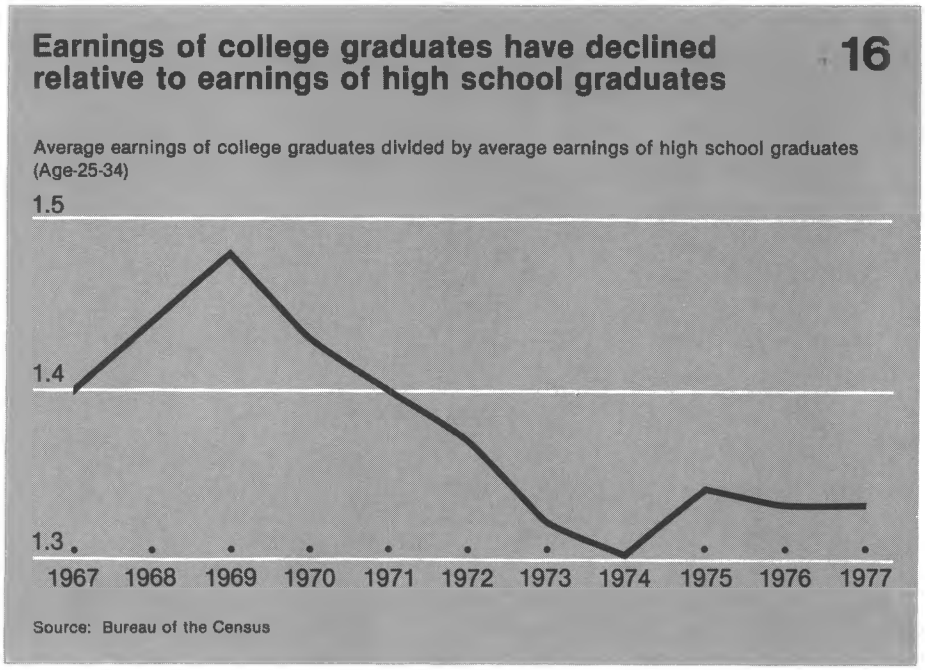
In addition to a spilling over into nontraditional occupations, graduates also have experienced higher rates of unemployment. From early 1969 to early 1978 the unemployment rate for all graduates increased from less than 1 percent to 2.5 percent, and for graduates 20 to 24 years old from 2.4 to 6.1 percent. Although some of this increase can be attributed to generally poor economic conditions, the rise in the rate of unemployment of college graduates reflects mostly an increasing supply of graduates. Young graduates still fared much better than young high school graduates, however, who had an unemployment rate of 11.3 percent in 1978. The difference in rates indicates, for the most part, that college graduates have been able to outbid nongraduates for jobs rather than remain unemployed.

Increased competition among graduates for jobs has also adversely effected their earnings. While average salaries of newly hired graduates have increased since 1969, earnings of nongraduates have increased more rapidly. As a result, the premium paid to college graduates has declined (chart 16). Part of this decline is due to the fact that competition for entry level positions in fields traditionally sought by graduates—such as accounting, law, teaching, and engineering has kept salaries down. Another is that a number of graduates have been forced to accept lower paying jobs not filled by graduates in the past.

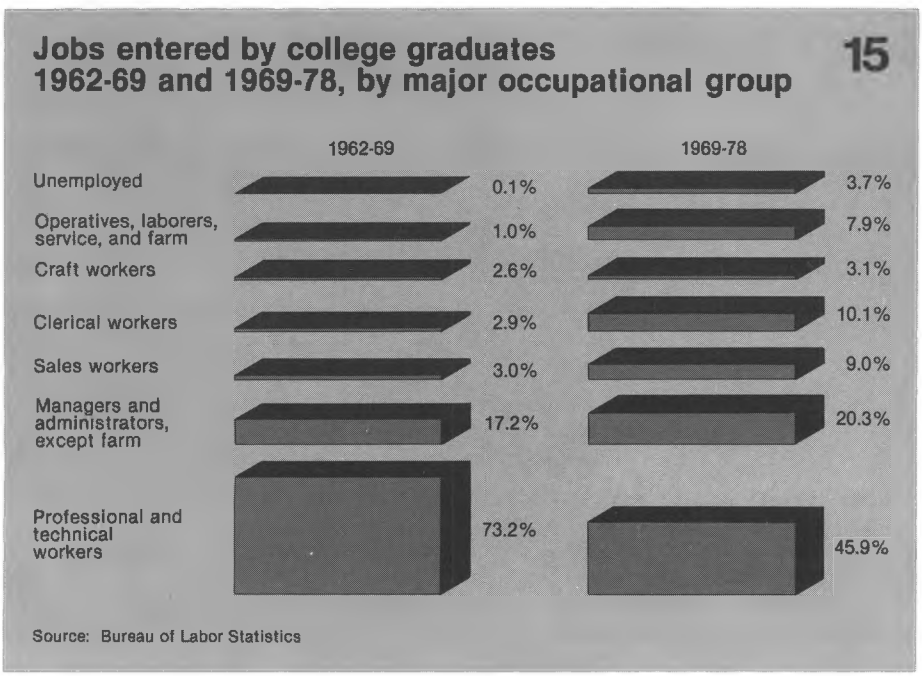
College graduates entering the labor force through the 1980's are likely to face job market conditions very similar to those faced by graduates during the 1970's. The number of labor force entrants having a college degree is expected to continue to exceed openings in the types of jobs traditionally sought by graduates. About 3 graduates out of 4 are expected to continue to find the kinds of jobs sought by graduates, but about 1 graduate in 4 will have to enter nontraditional occupations or face unemployment.

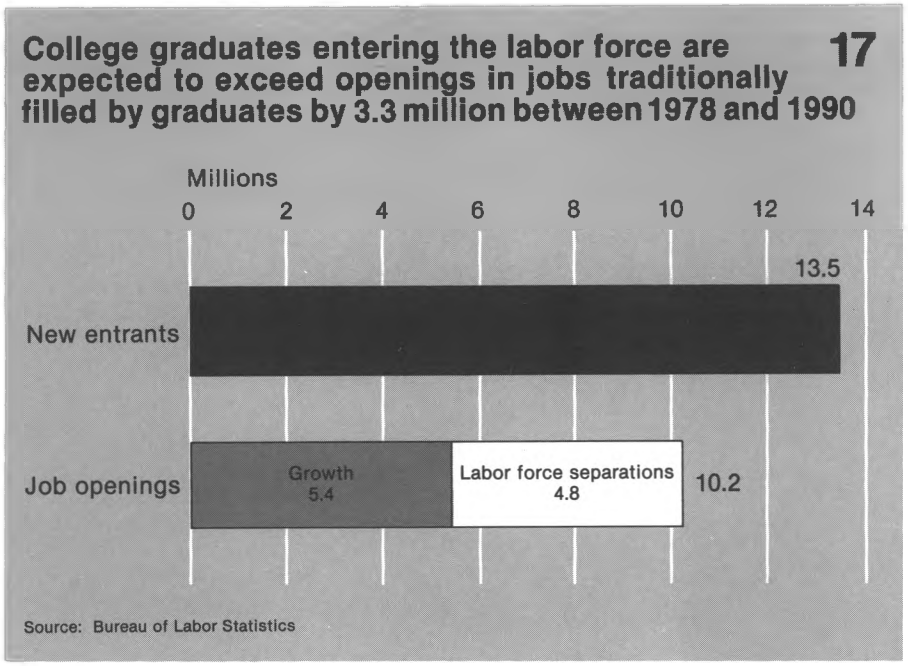
Estimates based primarily on National Center for Education Statistics projections of earned degrees indicate that about 13.5 million college graduates will enter the labor

Earnings of college graduates have declined relative to earnings of high school graduates 16



Jobs entered by college graduates 1962-69 and 1969-78, by major occupational group 15





force over the 1978–90 period. In comparison, only about 10.2 million job openings are expected to arise in traditional jobs for college graduates. (Chart 17) About half of these projected openings are expected to result from growth in the kinds of jobs filled by graduates in the past and from upgrading jobs, and half from the need to replace graduates who retire, die, or leave the labor force for other reasons.

These projections of a continued unfavorable job market for college graduates reflect the fact that the number of graduates entering the labor force annually over the 1978–90 period is not expected to decline from current high levels, nor is the number of job openings for graduates expected to increase.

The number of bachelors degrees granted, the key determinant of new entrants, is expected to be slightly higher, annually—on average—than the numbers granted during the 1970's. While the number of 22 year olds is projected to decline during the last half of the 1980's, the number of bachelor's degrees is not expected to fall, as growth in the number of older students probably will offset the drop in the number of younger ones.

Fewer growth openings are expected, primarily because professional and technical occupations, which employed the majority of graduates in 1978, are expected to grow at less than half the annual rate of the 1970–78 period. The number of teaching jobs is not expected to increase, and most other professional and technical occupations are expected to grow more slowly, reflecting slower growth in the labor force in general.

The number of job openings created as employed graduates die or retire is expected to be only slightly higher annually—on average. Even though more graduates will be employed, most of the increase will be among new graduates and few of them are likely to die or retire.

Like graduates in the 1970's, future graduates may be less likely to find jobs in the occupation of their choice than graduates during the 1960's. Many may continue to experience periods of unemployment, or move from job to job seeking employment that fits their abilities and expectations. A substantial number may continue to compete with nongraduates for the more desirable jobs not previously filled by graduates. As in the past, college graduates will generally have an advantage over those with less education, but in some fields they may face competition from junior and community college graduates who have learned job related skills. In others, such as high paying sales jobs, proven sales ability may be more valued by employers than a degree. Graduates who are least well prepared for the job market or most unlucky will clearly face the prospect of underutilization of their skills and job dissatisfaction. As in the early and mid 1970's, however, almost all will probably be able to find a job, and few should face sustained unemployment.

Although the employment outlook for college graduates may not be promising, neither is it bleak. Job satisfaction depends upon a number of factors that are difficult to analyze, and it is not possible to classify all jobs as being appropriate or not appropriate for graduates. Even though college graduates have not been traditionally employed in an occupation, they still may find the work satisfying. Many high paying jobs with substantial responsibility have been filled primarily by non-college graduates in the past, and graduates can be expected to move into these in greater numbers. Graduates who enter clerical, sales, and blue-collar jobs may be able to prove their abilities once on the job and be promoted. Some graduates who may take jobs as clerks should eventually be able to move into administrative positions, and those in craft and service-worker jobs are likely to be able to advance more quickly within their organization, or start their own businesses.

Finding a job directly related to one's college major probably is not necessary for job satisfaction. One study found that most liberal arts graduates—those whose college majors were in fields such as English, history, and psychology—generally were happy with jobs in business administration.[1] Business administration, like many other jobs, permits graduates to use their writing, analytical, and interpersonal skills. If graduates feel they are using these skills, they are likely to be satisfied with their jobs.

The study also found that a substantial proportion of graduates in jobs they considered nonprofessional, perhaps not fully utilizing these skills, were nevertheless satisfied. Ideas about what constitutes an appropriate job for graduates are changing. More graduates see jobs such as craft workers, farmers, and self-employed retail store managers as more desirable than the traditional jobs chosen by graduates. This shift in attitudes eases the problems of underemployment and job dissatisfaction for many college graduates.

It should be pointed out that the number of people actually obtaining degrees and entering the labor force may be lower than projected here. A higher proportion of high school graduates, aware of the plight of college graduates, may decide not to attend a 4-year college. They may decide that attending a 2-year community or junior college, entering an apprenticeship, or finding a job right out of high school is a better preparation for their longterm career goals.

College enrollees already are making some adjustments in their selection of major field of study. For example, the proportions preparing to enter overcrowded fields have declined. In teaching, education degrees have declined from 21 percent in 1973 to 15 percent of all bachelor's degrees earned in 1978, and lower proportions are studying liberal arts as well. Higher proportions are obtaining degrees in career related majors such as engineering, accounting, and public affairs and service. While this does not alter the number of graduates who are likely to seek jobs through the 1980's, it may make graduates better equipped to compete with nongraduates who have technical training or work experience in these fields.

Despite the overall unfavorable job outlook for college graduates, those prepared to enter certain occupations such as accountant, bank officer, computer programmer, engi-

[1]Nancy L. Ochsner and Lewis C. Solmon, *College Education and Employment. . . . . The Recent Graduates* (Bethlehem, Pa., The CPC Foundation, 1979). The study is a followup of a group of people whose highest degree held was a bachelor's degree: 1961 college freshmen who were working full time between November 1974 and March 1975, and 1970 college freshmen who were working full time between November 1976 and March 1977.

neer, and physician are expected to have good employment opportunities. Even in overcrowded occupations, many of the better qualified graduates will find jobs.

Knowledge about prospective employment opportunities in various occupations can enable individuals to make a more informed decision about whether to attend college, and if they do choose to attend, what field to study. The following chapter discusses the outlook for more than 100 occupations usually sought by college graduates.

Accountants

(D.O.T. 160 and 090.227-010)

Nature of the Work

Managers must have up-to-date financial information to make important decisions. Accountants prepare and analyze financial reports that furnish this kind of information.

Three major fields are public, management, and government accounting. Public accountants have their own businesses or work for accounting firms. Management accountants, also called industrial or private accountants, handle the financial records of their company. Government accountants examine the records of government agencies and audit private businesses and individuals whose dealings are subject to government regulations.

Accountants often concentrate on one phase of accounting. For example, many public accountants specialize in auditing (examining a client's financial records and reports to judge their compliance with standards of preparation and reporting). Others specialize in tax matters, such as preparing income tax forms and advising clients of the advantages and disadvantages of certain business decisions. They often help develop estate plans that will have high benefits and low taxes. Still others specialize in management consulting and give advice on a variety of matters. They might develop or revise an accounting system to serve the needs of clients more effectively or give advice about different types of computers or electronic data processing systems.

Management accountants provide the financial information executives need to make sound business decisions. They may work in areas such as taxation, budgeting, costs, or investments. Internal auditing, a specialization within management accounting, is rapidly growing in importance. Accountants who work as internal auditors examine and evaluate their firm's financial systems and management control procedures to ensure efficient and economical operation.

Many persons with accounting backgrounds work for the Federal Government as Internal Revenue Service agents or are involved in financial management, financial institution examining, and budget administration.

Accountants staff the faculties of business and professional schools. As educators, they may teach accounting as well as finance, marketing, management, and related fields; some are primarily researchers or administrators. Many accountants teach part time, work as consultants, or serve on committees of professional organizations. For additional information, see the *Handbook* statement on college and university faculty.

Working Conditions

Most accountants work in offices and have structured work schedules. Accounting teachers, on the other hand, with more flexible schedules, divide their time among teaching, research, and administrative responsibilities. Self-employed accountants, who may set up offices at home, work as many hours as the business requires.

Tax accountants work long hours under heavy pressure during the tax season. Accountants employed by large firms may travel extensively to audit or work for clients or branches of the firm.

Places of Employment

Over 980,000 people worked as accountants in 1978, including over 150,000 Certified Public Accountants (CPA), 17,000 licensed public accountants, and about 9,000 Certified Internal Auditors (CIA).

About 60 percent of all accountants do management accounting. An additional 25 percent are engaged in public accounting as proprietors, partners, or employees of independent accounting firms. Other accountants work for Federal, State, and local government agencies, and some teach in colleges and universities. Opportunities are plentiful for part-time work, particularly in smaller firms.

Accountants are found in all business, industrial, and government organizations. Most, however, work in large urban areas where many public accounting firms and central offices of large businesses are concentrated, such as Chicago, Los Angeles, New York, and Washington, D.C.

Training, Other Qualifications, and Advancement

Training is available at colleges and universities, accounting and business schools, and correspondence schools. Although many graduates of business and correspondence schools are successful, most public accounting and business firms require applicants for accountant and internal auditor positions to have at least a bachelor's degree in accounting or a closely related field. Many employers prefer those with the master's degree in accounting. A growing number of large employers prefer applicants who are familiar with computers and their applications in accounting and internal auditing. For beginning accounting positions, the Federal Government requires 4 years of college (including 24 semester hours in accounting or auditing) or an equivalent combination of education and experience. However, applicants face competition for the limited number of openings in the Federal Government. For teaching positions, most colleges and universities require at least the master's degree or the Certified Public Accountant Certificate.

Previous experience in accounting can help an applicant get a job. Many colleges offer students an opportunity to gain experience through summer or part-time internship programs conducted by public accounting or business firms. Such training is invaluable in gaining permanent employment in the field.

Professional recognition through certification or licensure also is extremely valuable. Anyone working as a "certified public accountant" must hold a certificate issued by a State board of accountancy. All States use the four-part Uniform CPA Examination, prepared by the American Institute of Certified Public Accountants, to establish certification. The CPA examination is very rigorous and candidates are not required to pass all four parts at once. However, most States require candidates to pass at least two parts for partial credit. Although the vast majority of States require CPA candidates to be college graduates, some States substitute a certain number of years of public accounting experience for the educational requirement. Most States require applicants to have some public accounting experience for a CPA certificate. For example, bachelor's degree holders most often need 2 years of experience while master's degree holders often need no more than 1 year. Based on recommendations made by the American Institute of Certified Public Accountants, a few States now require or are considering requiring CPA candidates to have a bachelor's degree plus 30 additional semester hours. This trend is expected to continue in the coming years.

For a "public accountant" or "accounting practitioner" license or registration, some States require only a high school diploma while others require college training. Information on requirements may be obtained directly from individual State boards of accountancy or from the National Society of Public Accountants.

The Institute of Internal Auditors, Inc., confers the Certified Internal Auditor (CIA) upon graduates from accredited colleges and universities who have completed 3 years' experience in internal auditing and who have passed a four-part examination. The National Association of Accountants (NAA) confers the Certificate in Management Ac-

counting (CMA) upon candidates who pass a series of uniform examinations and meet specific educational and professional standards.

Persons planning a career in accounting should have an aptitude for mathematics, be able quickly to analyze, compare, and interpret facts and figures, and to make sound judgments based on this knowledge. They must question how and why things are done and be able to clearly communicate the results of their work, orally and in writing, to clients and management.

Accountants must be patient and able to concentrate for long periods of time. They must be good at working with systems and computers as well as with people. Accuracy and the ability to handle responsibility with limited supervision are important.

Perhaps most important, because millions of financial statement users rely on the services of accountants, the public expects accountants to have the highest standards of integrity.

A growing number of States require both CPA's and licensed public accountants to complete a certain number of hours of continuing education before licenses can be renewed. Increasingly, accountants are studying computer programming so they can adapt accounting procedures to data processing. Although capable accountants should advance rapidly, those having inadequate academic preparation may be assigned routine jobs and find promotion difficult.

Junior public accountants usually start by assisting with auditing work for several clients. They may advance to intermediate positions with more responsibility in 1 or 2 years and to senior positions within another few years. Those who deal successfully with top industry executives often become supervisors, managers, or partners, or transfer to executive positions in private firms. Some open their own public accounting offices.

Beginning management accountants often start as ledger accountants, junior internal auditors, or as trainees for technical accounting positions. They may advance to chief plant accountant, chief cost accountant, budget director, or manager of internal auditing. Some become controllers, treasurers, financial vice-presidents, or corporation presidents. Many corporation executives have backgrounds in accounting and finance. In the Federal Government, beginners are hired as trainees and usually are promoted in a year or so. In college and university teaching, those having minimum training and experience may receive the rank of instructor without tenure; advancement and permanent faculty status depend upon further education and teaching experience and are increasingly difficult to attain.

Employment Outlook

Employment is expected to grow faster than the average for all occupations through the 1980's due to increasing pressure on businesses and government agencies to improve budgeting and accounting procedures. Because of the size of the occupation, however, even more job openings should result from deaths, retirements, and other separations from the labor force than from employment growth.

Demand for skilled accountants will rise as managers rely increasingly on accounting information to make business decisions. For example, plant expansion, mergers, or foreign investments may depend upon the financial condition of the firm, tax implications of the proposed action, and other considerations. On a smaller scale, small businesses are expected to rely more and more on the expertise of public accountants in planning their operations. Government legislation to monitor business activity also is expected to add to the demand for accountants. Legislation and regulations regarding pension reform, tax reform, revenue sharing, funding of elections, financial disclosure, and other matters should create many jobs for accountants. In addition, increases in investment and lending and the need for government to allocate limited funds also should spur demand for accountants.

College graduates will be in greater demand for accounting jobs than applicants who lack this training. Opportunities for accountants without a college degree will occur mainly in small businesses and accounting firms.

Many employers prefer graduates who have worked part time in a business or accounting firm while in school. In fact, experience has become so important that some employers in business and industry seek persons with 1 or 2 years' experience for beginning positions.

The increasing use of computers and electronic data processing systems in accounting should stimulate the demand for those trained in such procedures.

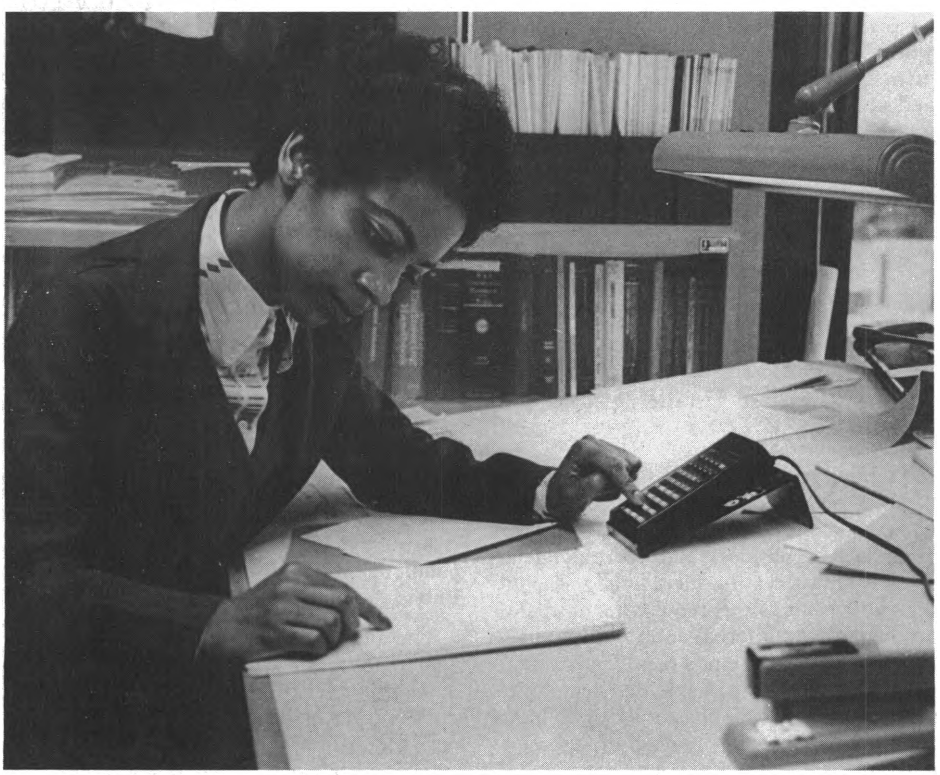
Earnings

According to a 1978 College Placement Council Salary Survey, bachelor's degree candidates in accounting received offers averaging around $13,500 a year; master's degree candidates, $16,000. Public accounting firms offered bachelor's degree candidates around $14,000 a year.

The starting salary of beginning accountants in private industry was about $12,800 a year in 1978, according to a national survey. Earnings of experienced accountants ranged between $15,700 and $27,300, depending on their level of responsibility and the complexity of the accounting system. Chief accountants who direct the accounting program of a company or one of its establishments earned between $23,700 and $39,900, depending upon the scope of their authority and size of professional staff.

According to the same survey, beginning auditors averaged $13,200 a year in 1978, while experienced auditors' earnings ranged between $15,700 and $23,100.

In the Federal Government, the starting salary for junior accountants and auditors was $10,507 in early 1979. Candidates who had a superior academic record could begin at $13,014. Applicants with a master's degree or 2 years' professional experience began at $15,920. Accountants in the Federal Govern-



Accountants must be able to concentrate and work accurately on detailed matters for long periods of time.

ment averaged about $24,300 a year in early 1979.

According to a 1978 survey of State governments, average annual salaries of beginning accountants or auditors ranged from about $10,800 to $14,200; principal auditors (work at first level of full supervision), $15,900 to $21,300; accounting supervisors (work at first level of full supervision), $14,700 to $19,600; and chief fiscal officers (those who administer accounting and fiscal management programs of large State agencies), $20,800 to $27,400.

Related Occupations

Accountants design and control financial records and analyze financial data. Others for whom training in accounting is invaluable include appraisers, budget officers, loan officers, financial analysts, bank officers, actuaries, underwriters, FBI special agents, securities sales workers, and purchasing agents.

Sources of Additional Information

Information about careers in accounting and about aptitude tests administered in high schools, colleges, and public accounting firms may be obtained from:

American Institute of Certified Public Accountants, 1211 Avenue of the Americas, New York, N.Y. 10036.

Information on specialized fields of accounting is available from:

National Association of Accountants, 919 Third Ave., New York, N.Y. 10022.

National Society of Public Accountants, 1717 Pennsylvania Ave. NW., Washington, D.C. 20006.

Institute of Internal Auditors, 249 Maitland Ave., Altamonte Springs, Fla. 32701.

For information on educational institutions offering a specialization in accounting, contact:

American Assembly of Collegiate Schools of Business, 1755 Massachusetts Ave. NW., Suite 320, Washington, D.C. 20036.

Actors and Actresses

(D.O.T. 150.047)

Nature of the Work

Making a character come to life before an audience is a job that has great glamour and fascination. It is demanding and often uncertain work, however, which requires persistence, practice, and hard work as well as special acting talent.

Only a few actors and actresses achieve recognition as stars on the stage, in motion pictures, or on television or radio. A somewhat larger number are well-known, experienced performers, who frequently are cast in supporting roles. However, most actors and actresses struggle for a toehold in the profession and are glad to pick up parts wherever they can.

New stage actors generally start in "bit" parts where they speak only a few lines. If successful, they may progress to larger, supporting roles. They also may serve as understudies for the principals. Film and television actors, in contrast, may begin in large roles or move into programs from working in commercials.

In addition to the actors and actresses with speaking parts, "extras," who have no lines to deliver, are used in various ways in almost all motion pictures and many television shows and theatre productions. In "spectacular" productions, a large number of extras take part in crowd scenes.

Some actors find alternative jobs as coaches of drama or directors of stage, television, radio, or motion picture productions. A few teach in drama departments of colleges and universities, where they usually specialize in a particular aspect of drama, such as stage movement, stage speech and voice, or acting. Some professional actors employed by theater companies also teach acting in courses offered to the public.

Working Conditions

Acting demands patience and total commitment, since aspiring actors and actresses must wait for parts or filming schedules, work long hours, and often do much traveling. Evening work is a regular part of a stage actor's life. Rehearsals may be held late at night and on weekends and holidays. When plays are on the road, weekend traveling often is necessary. Flawless performances require the tedious memorizing of lines, which sometimes involves long rehearsal schedules. Other performances, such as television programs, often allow little time for rehearsal, so that the actor must deliver a good performance with very little preparation. The actor needs stamina to withstand the heat of stage or studio lights, or the adverse weather conditions that may exist "on location."

Places of Employment

About 13,400 actors and actresses worked in stage plays, motion pictures, industrial shows, and commercials in 1978. Many thousands more were available for work in these areas. In the winter, most employment opportunities on the stage are in New York and other large cities. In the summer, stock companies in suburban and resort areas provide employment. In addition, many cities have "little theaters," repertory companies, and dinner theaters, which provide opportunities for local talent as well as for professional actors and actresses. Normally, casts are selected in New York City for shows that go "on the road."

Employment in motion pictures and film television is centered in Hollywood and New York City, although a few studios are located in Miami and other parts of the country. In addition, many films are shot on location and employ local professionals and nonprofessionals as "day players" and "extras." A number of American-produced films are shot in foreign countries. In television, most opportunities for actors are at the headquarters of the major networks—in New York, Los Angeles, and, to a lesser extent, Chicago. A few local television stations occasionally employ actors.

Training and Other Qualifications

Young persons who aspire to acting careers should take part in high school and college plays, or work with little theaters and other acting groups for experience.

Formal training in acting, which is increasingly necessary, can be obtained at schools of

Acting requires talent, versatility, and stage presence as well as hard work and practice.

dramatic arts, located chiefly in New York, and in hundreds of colleges and universities throughout the country. About 740 colleges and universities confer bachelor's or higher degrees on students who major in dramatic and theater arts. College drama curriculums usually include courses in liberal arts, stage speech and movement, directing, playwriting, play production, and history of the drama, as well as practical courses in acting. From these, the student develops an appreciation of the great plays and a greater understanding of the roles he or she may be called on to play. Graduate degrees in fine arts or drama are needed for college teaching positions.

In all media, the best way to start is to use local opportunities and to build on the basis of such experience. Many actors who are successful in local productions eventually try to appear on the New York stage. Modeling experience may also be helpful in obtaining employment in television or motion pictures. Above all, persons who plan to pursue an acting career must have talent and the creative ability to portray different characters. They must have poise, stage presence, and aggressiveness to project themselves to the audience. At the same time, the ability to follow directions is important.

To become a movie extra, one must usually be listed by Central Casting, a no-fee agency that works with the Screen Extras Guild and supplies all extras to the major movie studios in Hollywood. Applicants are accepted only when the number of persons of a particular type on the list—for example, athletic young men, old ladies, or small children—is below the foreseeable need. In recent years, only a very small proportion of the total number of applicants have succeeded in being listed. An actor employed as an extra in a film has very little opportunity to advance to a speaking role in that film.

The length of an actor's or actress' working life depends largely on skill and versatility. Great actors and actresses can work almost indefinitely. Generally, however, employment becomes increasingly limited by middle age, especially for those who become typed in romantic, youthful roles. Due to the factors discussed, persons who intend to pursue an acting career may find that employment and earnings are irregular.

Employment Outlook

Overcrowding has existed in the acting field for many years, and this condition is expected to persist. In the legitimate theater, motion pictures, radio, and television, job applicants greatly exceed the jobs available. As a result, many actors and actresses are employed in their profession for only a part of the year.

Motion pictures and TV have greatly reduced employment opportunities for actors in the theater. Although a motion picture production may use a very large number of actors during filming, films are widely distributed and may be used for years. Also, some American-produced films are shot in foreign countries, resulting in reduced employment opportunities for American actors and actresses. Television employs a large number of actors and actresses. However, employment in this medium has been reduced by the Federal Communications Commission ruling that decreased major TV network prime time programming. Local stations often use reruns or low-cost game shows that employ few actors. Also, the trend toward 1- to 2-hour programs and more reruns shortens the period of employment and reduces the number of persons needed.

One possibility for future growth in the legitimate theater lies in the establishment of year-round professional acting companies in cities. The number of such acting groups is growing. The recent growth of summer and winter stock companies, outdoor and regional theaters, repertory companies, and dinner theaters also has increased employment opportunities. In addition, some increases may be likely in the employment of actors on television in response to expansion of the Public Broadcasting System, UHF stations, and cable TV. The development and wider use of video cassettes also may result in some employment opportunities. These media will have a positive influence on employment only if original material and programs result, not reruns or old movies.

Though the field of acting as a whole is expected to grow faster than the average for all occupations through the 1980's, the number of persons seeking to enter the profession is expected to exceed by far the available openings. Even the highly talented are likely to face stiff competition and economic difficulties.

Earnings

Actors and actresses in the legitimate theater belong to the Actors' Equity Association; in motion pictures, including television films, to the Screen Actors Guild, Inc., or to the Screen Extras Guild, Inc.; in television or radio, to the American Federation of Television and Radio Artists (AFTRA). These unions and the producers of the shows sign basic collective bargaining agreements which set minimum salaries, hours of work, and other conditions of employment. Each actor also signs a separate contract, which may provide for a higher salary than that specified in the basic agreement.

The minimum weekly salary for actors in Broadway productions was about $355 in 1978. Those in small "off-Broadway" theaters received minimums ranging from $140 to $270 a week, depending on the seating capacity of the theater. For shows on the road, the minimum rate was $27.50 extra per day. (All minimum salaries are adjusted upward automatically, by union contract, commensurate with increases in the cost of living as reflected in the Bureau of Labor Statistics Consumer Price Index.)

In 1978, motion picture and television actors and actresses earned a minimum daily rate of $225, or $785 for a 5-day week. The minimum rate for a 3-day week for actors employed on a 1 or 1/2-hour television show was $572. For extras, the minimum rate was $60 a day. Television actors also receive additional compensation for reruns.

However, annual earnings of actors and actresses are adversely affected by the frequent periods of unemployment experienced by many. According to data obtained by the Actors' Equity Association (which represents actors who work on the stage) and the Screen Actors Guild, between two thirds and three quarters of their members earned $2,500 or less a year from acting jobs in 1978, and less than 5 percent earned over $25,000 from such work. Because of the frequent periods of unemployment characteristic of this profession, many actors must supplement their incomes by maintaining other, nonacting jobs.

Many well-known actors and actresses have salary rates above the minimums, and salaries of the few top stars are many times the figures cited.

Eight performances amount to a week's work on the legitimate stage, and any additional performances are paid for as overtime. After the show opens, the basic workweek is 36 hours, including 12 hours for rehearsals. Before it opens, however, the workweek usually is longer to allow time for rehearsals.

Most actors are covered by a union health, welfare, and pension fund, including hospitalization insurance, to which employers contribute. Under some employment conditions, Equity and AFTRA members have paid vacations and sick leave. Most stage actors get little if any unemployment compensation solely from acting since they seldom have enough employment in any State to meet the eligibility requirements. Consequently, when they are between acting jobs, they often have to take any casual work they can find.

Related Occupations

Actors and actresses entertain people through their interpretations of dramatic roles. They rely on facial and verbal expressions as well as body motions for their creative expression. Related occupations for people with these skills include: clowns, comedians, directors, disc jockeys, drama teachers or coaches, impersonators, mimes, narrators, and radio and television announcers.

Sources of Additional Information

Information on colleges and universities and conservatories that offer a major in drama is available from:

American Theater Association, 1000 Vermont Ave. NW., Washington, D.C. 20005.

Actuaries

(D.O.T. 020.167-010)

Nature of the Work

Why do young persons pay more for automobile insurance than older persons? How much should an insurance policy cost? Answers to these and similar questions are provided by actuaries who design insurance and pension plans that can be maintained on a sound financial basis. They assemble and analyze statistics to calculate probabilities of death, sickness, injury, disability, unemployment, retirement, and property loss from accident, theft, fire, and other hazards. Actuaries use this information to determine the expected insured loss. For example, they may calculate how many persons who are 21 years old today can be expected to live to age 65—the probability that an insured person might die during this period is a risk to the company. They then calculate a price for assuming this risk that will be profitable to the company yet be competitive with other insurance companies. Finally, they must make sure that the price charged for the insurance will enable the company to pay all claims and expenses as they occur. In the same manner, the actuary calculates premium rates and determines policy contract provisions for each type of insurance offered. Most actuaries specialize in either life and health insurance or property and liability (casualty) insurance; a growing number specialize in pension plans.

To perform their duties effectively, actuaries must keep informed about general economic and social trends, and legislative, health, and other developments that may affect insurance practices. Because of their broad knowledge of insurance, company actuaries may work on problems arising in their company's investment, group underwriting, or pension planning departments. Actuaries in executive positions help determine general company policy. In that role, they may be called upon to explain complex technical matters to company executives, government officials, policyholders, and the public. They may testify before public agencies on proposed legislation affecting the insurance business, for example, or explain intended changes in premium rates or contract provisions.

Actuaries who work for the Federal Government usually deal with a particular insurance or pension program, such as social security or life insurance for veterans and members of the Armed Forces. Actuaries in State government positions regulate insurance companies, supervise the operations of State retirement or pension systems, and work on problems connected with unemployment insurance or workers' compensation. Consulting actuaries set up pension and welfare plans for private companies, unions, and government agencies. They calculate future benefits and determine the amount of the annual employer contribution. Actuaries who are enrolled under the provisions of the Employee Retirement Income Security Act of 1974 (ERISA) evaluate these pension plans and submit reports certifying their financial soundness.

Working Conditions

Actuaries have desk jobs that require no unusual physical activity; their offices generally are comfortable and pleasant.

Most actuaries work between 35 and 40 hours a week, although they may be required to work overtime during busy periods. Actuaries may travel to branch offices of their company or to clients.

Actuaries analyze statistical data.

Places of Employment

Approximately 9,000 persons worked as actuaries in 1978. Four of every 10 actuaries worked New York, Hartford, Chicago, Philadelphia, or Boston.

About two-thirds of all actuaries worked for private insurance companies. Almost 90 percent of these worked for life insurance companies; the rest worked for property and liability (casualty) companies. The number of actuaries employed by an insurance company depends on its volume of business and the types of insurance policies it offers. Large companies may employ over 100 actuaries on their staffs; others, generally smaller companies, may rely instead on consulting firms or rating bureaus (associations that supply actuarial data to member companies).

Consulting firms and rating bureaus employ about one-fifth of all actuaries. Other actuaries work for private organizations administering independent pension and welfare plans or for Federal and State government agencies. A few teach in colleges and universities.

Training, Other Qualifications, and Advancement

A good educational background for a beginning job in a large life or casualty company is a bachelor's degree with a major in mathematics or statistics; a degree in actuarial science is even better. Some companies hire applicants with a major in engineering, economics, or business administration, provided they demonstrate a thorough foundation in calculus, probability, and statistics (20-25 hours). Courses in accounting, computer science, economics, and insurance also are useful. Although only 25 colleges and universities offer a degree in actuarial science, several hundred schools offer a degree in mathematics or statistics.

A strong background in mathematics is essential for persons interested in a career as an actuary. Of equal importance, however, is the need to pass, while in school, one or more of the examinations offered by professional actuarial societies. Three societies sponsor programs leading to full professional status in they specialty. The Society of Actuaries gives nine actuarial examinations for the life and health insurance and pension field, the Casualty Actuarial Society gives ten examinations for the property and liability field, and the American Society of Pension Actuaries gives nine examinations covering the pension field. Because the first parts of the examination series of each society cover similar materials, students need not commit themselves to a career specialty until they have taken about five examinations. The first two test competence in subjects such as algebra, calculus, elementary statistics, geometry, and trigonometry; the next three the more advanced concepts of actuarial science such as theories of compound interest, mortality tables, and risk. Success in passing these first few examinations helps students evaluate

their potential as actuaries, and those who pass usually have better opportunities for employment and higher starting salaries.

Actuaries are encouraged to complete the entire series of examinations as soon as possible; completion generally takes from 5 to 10 years. Examinations are given twice each year. Extensive home study is required in order to pass the advanced examinations; many actuaries spend as much as 20-25 hours a week studying. Actuaries who complete five examinations in either the life insurance series or the pension series or seven examinations in the casualty series are awarded "associate" membership in their society. Those who have passed an entire series receive full membership and the title "fellow."

Consulting pension actuaries who service private pension plans and certify their solvency must be enrolled by the Joint Board for the Enrollment of Actuaries. Applicants for enrollment must meet certain experience and education requirements as stipulated by the Joint Board.

Beginning actuaries often rotate among different jobs to learn various actuarial operations and to become familiar with different phases of insurance work. At first, their work may be routine, such as preparing tabulations for actuarial tables or reports. As they gain experience, they may supervise clerks, prepare correspondence and reports, and do research.

Advancement to more responsible work as assistant, associate, and chief actuary depends largely on job performance and the number of actuarial examinations passed. Many actuaries, because of their broad knowledge of insurance and related fields, are selected for administrative positions in other company activities, particularly in underwriting, accounting, or data processing departments. Many advance to top executive positions.

Employment Outlook

Employment of actuaries is expected to rise faster than the average for all occupations through the 1980's. In addition to job openings resulting from growth in demand for actuaries, additional openings will arise each year as individuals retire, die, or transfer to other occupations. Job opportunities will be best for new college graduates who have passed at least two actuarial examinations while still in school and have a strong mathematical and statistical background. However, because of the large number of persons expected to receive degrees in actuarial science, mathematics, and statistics, and the large number of students taking actuarial examinations, competition for beginning jobs should remain keen.

Employment in this occupation is influenced to a great extent by the volume of insurance sales, which will continue to grow over the next decade. Shifts in the age distribution of the population through the 1980's will result in a large increase in the number of people with established careers and family responsibilities. This is the group that traditionally has accounted for the bulk of private insurance sales.

Increased sales, however, are only one determinant of the demand for actuaries. Changes in existing insurance practices have created a need for more actuarial services. For example, as more and more insurance companies branch out into more than one kind of insurance coverage, more actuaries will be needed to establish the rates for the different types of insurance offered. Growth in sales of relatively new forms of protection, such as dental, prepaid legal, and kidnap insurance also will create additional demand for actuaries. As more States pass competitive rating laws, many companies that previously relied on rating bureaus for actuarial data can be expected to expand existing actuarial departments or create new ones.

The liability of companies for damage resulting from their product has recieved much attention as a result of recent court decisions. In the years ahead, actuaries will be more involved in the development of product liability insurance, medical malpractice and workers' compensation coverage.

Earnings

In 1978, actuaries had average salaries more than twice as high as the average for all nonsupervisory workers in private industry, except farming. New college graduates entering the life insurance field without having passed any actuarial exams averaged $10,933 in 1978, according to a survey of U.S. companies by the Life Office Management Association (LOMA). Applicants who had successfully completed the first exam received $12,754 and those who had passed two exams averaged $13,584.

In the Federal Government, new graduates with the bachelor's degree could start at $10,500 a year in 1978. Applicants with either 1 year of graduate study or relevant work experience were hired at $13,000, and those with the master's degree or 2 years' experience started at $15,900 a year. Actuaries in the Federal Government averaged $28,350 a year in 1978.

Beginning actuaries can look forward to a marked increase in earnings as they gain professional experience and advance in an actuarial society's examination program. Life insurance companies usually give merit increases averaging from $566 to $978 to their actuaries as they pass each successive examination leading to membership in the Society of Actuaries. Associates who received that designation in 1978 averaged $18,325 a year; salaries for actuaries who become fellows during that year averaged $27,163. Fellows with additional years of experience earned substantially more—top actuarial executives averaged about $47,600 in 1978.

Although data are not available for salaries of actuaries in casualty companies or consulting firms, it is believed that salaries for these specialists generally are comparable to those paid by life insurance companies. Most actuaries have liberal vacation policies and other employee benefits.

Related Occupations

Actuaries assemble and analyze statistics as well as apply various statistical techniques in their day-to-day work. Other workers whose jobs involve similiar skills include mathematicians, statisticians, economists, financial analysts, and engineering analysts.

Sources of Additional Information

For facts about actuarial opportunities and qualifications, contact:

American Society of Pension Actuaries, 1700 K St., NW., Washington, D.C. 20006.

Casualty Actuarial Society, 110 Plaza, 250 West 34 St., New York, N.Y. 10001.

Society of Actuaries, 208 South LaSalle St., Chicago, Ill. 60604.

Air Traffic Controllers

(D.O.T. 193.162-018)

Nature of the Work

Air traffic controllers are the guardians of the airways. Controllers keep track of planes flying within their assigned area, giving pilots instructions that will keep the planes separated. Their immediate concern is safety, but controllers also must direct planes efficiently to minimize delays. Some regulate airport traffic; other regulate flights between airports.

Although airport controllers watch over all planes travelling through the airport's airspace, their main responsibility is to organize the flow of aircraft in and out of the airport. Relying both on radar and visual observation, they closely monitor each plane, maintaining a safe distance between all aircraft while guiding pilots between the hangar or ramp and the end of the airport's airspace.

During arrival or departure, each plane is handled by several controllers. As a plane approaches an airport, the pilot radios ahead to inform the terminal of its presence. The "arrival controller" in the radar room just beneath the control tower has a copy of the plane's flight plan and already has observed the plane on radar. If the way is clear, the arrival controller directs the pilot to a runway; if the airport is busy, the plane is fitted into a traffic pattern with other aircraft waiting to land. As the plane nears the runway, the pilot is asked to contact the tower. There, a "local controller," who also is watching the plane on radar, monitors the aircraft the last mile or so to the runway, delaying any departures that would interfere with the plane's approach. Once the plane has landed, a

"ground controller" in the tower directs it along the taxiways. The ground controller works almost entirely by sight, but may use radar if visibility is very poor.

A similar procedure is used for departures. The ground controller directs the plane to the proper runway. The local controller instructs the plane to take off, arranging a temporary break in arriving traffic if necessary. Once in the air, the plane is guided out of the airport's airspace by the "departure controller."

Controllers constantly watch the planes under their direction as they guide them to and from the airport. If a controller notices that two planes are on a collision course, one or both pilots will be instructed to turn or change altitude. Controllers also provide pilots with information about conditions at the airport, such as the weather, speed and direction of the wind, and visibility.

After each plane departs, airport traffic controllers notify enroute controllers who will next take charge. There are 25 enroute control centers located around the country. Airplanes generally fly along designated routes and each center is assigned a certain amount of airspace containing many of these routes. Enroute controllers work in teams of up to three members, depending on how heavy traffic is; each team is responsible for a section of the center's airspace. A team, for example, might be responsible for all planes that are between 30 to 100 miles north of an airport and flying at an altitude between 6,000 and 18,000 feet.

To prepare for planes about to enter the team's airspace, the "manual handoff controller" organizes flight plans coming over teletype machines. If two planes are scheduled to enter the team's airspace at a similar time, location, and altitude, this controller may arrange with the preceding control unit for one plane to change plans. The previous unit may have been another team at the same or an adjacent center, or a departure controller at a neighboring terminal. As a plane approaches a team's airspace, the "radar handoff controller" accepts responsibility for the plane from the previous controlling unit. The controller also delegates responsibility for the plane to the next controlling unit when the plane leaves the team's airspace.

The "radar controller," who supervises the other team members, observes the planes in the team's airspace on radar and communicates with the pilots when necessary. Radar controllers warn pilots about nearby planes, bad weather conditions, and other possible hazards. If two planes are on a collision course, they will be directed around each other. Or if a pilot wants to change altitude in search of better flying conditions, the controller will check to determine that no other planes will be along the proposed path during the altitude change. As the flight progresses, the team responsible for the aircraft notifies the next team in charge. Through this coordination, one team after another watches over the plane until it arrives safely at its destination.

Both airport and enroute controllers usually have several planes under their control at one time and often have to make quick decisions about completely different activities. For example, an arrival controller at an airport might direct a plane on its landing approach and at the same time provide pilots just entering the airport's airspace with information about conditions at the airport. While instructing these pilots, the controller also would observe other planes in the vicinity, such as those in a holding pattern waiting for permission to land, to determine that they remain well separated.

Working Conditions

Controllers work a basic 40-hour week; however, they may work additional hours for which they receive overtime pay or equal time off. Because control towers and centers must be operated 24 hours a day, 7 days a week, controllers rotate night and weekend shifts.

Air traffic controllers sometimes work under great stress. They must keep track of several planes at the same time and make certain all pilots receive correct instructions.

Places of Employment

About 21,000 persons worked as air traffic controllers in 1978, mostly at major airports and air route traffic control centers located near large cities. Almost all were employed by the Federal Aviation Administration (FAA).

Training, Other Qualifications, and Advancement

Air traffic controller trainees are selected through the competitive Federal Civil Service System. Applicants must be less than 31 years old and must pass a written test that measures their ability to learn and perform the controller's duties. In addition, applicants must have 3 years of general work experience or 4 years of college, or a combination of both. Applicants must be in excellent health and have vision correctable to 20/20.

Potential controllers should be articulate, since directions to pilots must be given quickly and clearly. A quick and retentive memory also is important because controllers constantly receive information about the planes under their direction which they must immediately grasp, interpret, and remember for a short period. A decisive personality is an asset, since controllers often have to make rapid decisions.

Successful applicants receive a combination of on-the-job and formal training to learn the fundamentals of the airway system, Federal aviation regulations, controller equipment, and aircraft performance characteristics. They receive approximately 16 weeks of intensive training, including practice on simulators, at the FAA Academy in Oklahoma City. It then takes several years of progressively more responsible work experience, interspersed with considerable classroom instruction and independent study, to become a fully qualified controller.

At airports new controllers begin in the tower, where they clear planes for takeoff. The next step is to ground controller followed by local controller, then departure controller, and finally, arrival controller. At a center, new controllers are first assigned to delivering teletyped flight plans to teams, gradually advancing to the position of manual handoff controller, then radar handoff controller and then radar controller. Failure to become proficient in any position at a facility within a specified time may result in dis-

Controllers constantly monitor their radar screens to make sure planes remain well separated.

missal. A substantial minority of controllers fail to complete either the academy or the on-the- job portion of the training program. Each year, controllers must pass a physical examination. They must pass a job performance examination twice each year.

Controllers can transfer to jobs at different locations and advance to supervisory positions. Some advance to management or staff jobs in air traffic control and a few to top administrative jobs in the FAA.

Employment Outlook

Employment of air traffic controllers is expected to increase about as fast as the average for all occupations through the 1980's. In addition to openings resulting from growth, many others will arise as experienced controllers retire, die, or leave the occupation for other reasons. Competition for jobs should be keen, however, because the number of qualified applicants is expected to be much greater than the number of openings.

As the number of aircraft increases, the skyways will become more congested and more controllers will be needed. Also, to prevent collisions, the FAA has created spaces near certain airports and above certain altitudes within which pilots must receive directions from air traffic controllers. If, as expected, the number and size of these spaces are expanded, additional controllers will be needed despite the greater use of new, automated control equipment.

College graduates or individuals who have civilian or military experience as controllers, pilots, or navigators will have the best employment opportunities.

Earnings

In 1978, controller trainees earned $12,500 a year; the average for all controllers was $25,400 a year, or over twice that for all nonsupervisory workers in private industry, except farming. Depending on length of service, they receive 13 to 26 days of paid vacation and 13 days of paid sick leave each year, life insurance, health benefits, and, due to the stress involved in the work, a more liberal retirement program than other Federal employees.

Many controllers belong to the Professional Air Traffic Controllers Organization.

Related Occupations

Other occupations which involve the direction and control of traffic in air transportation are airline-radio operator, airplane dispatcher, and flight service specialist.

Sources of Additional Information

A pamphlet providing general information about controllers and instructions for submitting an application is available from any U.S. Office of Personnel Management Job Information Center. Look under U.S. Government, Office of Personnel Management, in your telephone book to obtain a local Job Information Center telephone number and call for a copy of Announcement 418. If there is no listing in your telephone book, dial the toll-free number 800-555-1212 and request the number of the Office of Personnel Management Job Information Center for your location.

Airplane Pilots

(D.O.T. 196.167-010, .223-010 through .263-022, .263-030, -034, and -042)

Nature of the Work

Pilots are skilled, highly trained professionals who fly planes to carry out a wide variety of tasks. Although most pilots transport passengers and cargo, many others perform tasks such as crop dusting, inspecting powerlines, and taking photographs.

Except on small aircraft, two pilots usually are needed to fly the plane. Generally, the most experienced pilot (called captain by the airlines) is in command and supervises the other crew members on board. The copilot assists in communicating with air traffic controllers, monitoring the instruments, and flying the plane. Most large airliners have a third pilot in the cockpit who serves as flight engineer. The flight engineer assists the other pilots by monitoring and operating many of the instruments and systems, making minor inflight repairs, and watching for other aircraft.

Before departure, pilots plan their flights carefully. They confer with dispatchers and weather forecasters to find out about weather conditions en route and at their destination. Based on this information, they choose a route, altitude, and speed that will give a fast, safe, and smooth flight. When flying under instrument flight rules, it is the responsibility of the pilot in command to assure that an instrument flight plan is filed with air traffic control so that the flight can be coordinated with other air traffic.

Before taking off, pilots thoroughly check their planes to determine that the engines, controls, instruments, and other systems are working properly. They also make sure that baggage or cargo has been loaded correctly.

Takeoff and landing are the most difficult parts of the flight and require close coordination between the pilot and copilot. For example, as the plane accelerates for takeoff, the pilot concentrates on the runway while the copilot scans the instrument panel. For large airplanes, the pilots already have calculated the speed they must attain to become airborne, taking into account the altitude of the airport, the outside temperature, the weight of the plane, and the speed and direction of the wind. The moment the plane reaches this speed, the copilot informs the pilot who then pulls back on the controls to raise the nose of the plane.

Unless the weather is bad, the actual flight is relatively easy. Pilots steer the plane along their planned route and are monitored by the air traffic control stations they pass along the way. They continuously scan the instrument panel to check their fuel supply and the condition of their engines. Pilots may request a change in altitude or route if circumstances dictate. For example, if the weather briefing led the pilots to expect a smoother ride than is being experienced, they may ask air traffic control if pilots flying at other altitudes have reported better conditions. If so, they may request a change. This procedure also may be used to find a stronger tailwind or a weaker headwind to save fuel and increase speed.

If visibility is poor, pilots must rely completely on their instruments. Using the readings on the altimeter, they know how high above ground they are and can fly safely over mountains and other obstacles. Special navigation radios give pilots precise information which, with the help of special maps, tell them their exact position. Other very sophisticated equipment provides directions to a point just above the end of a runway and enables pilots to land completely "blind."

Once on the ground, pilots must complete records on their flight for their company and the Federal Aviation Administration (FAA).

Airline pilots have the services of large support staffs and consequently perform few nonflying duties. Pilots employed by businesses that use their own aircraft, however, usually are the businesses' only experts on flying and consequently have many other duties. For example, since pilots understand the requirements for a balanced plane, the business pilot loads the plane and handles all passenger luggage. While the plane is being refueled, the business pilot stays with it to assure that the job is done properly. Other nonflying responsibilities include keeping records, scheduling flights and major maintenance, and performing minor maintenance and repair work on their planes. Some pilots are instructors and spend much of their time giving flying lessons. They teach their students the principles of flight in ground school classes and demonstrate how to operate the aircraft in "dual-controlled" planes. A few specially trained pilots employed by the airlines are "examiners" or "check pilots." They periodically fly with each airline pilot and copilot to make sure that they are proficient.

Working Conditions

By law, airline pilots cannot fly more than 85 hours a month. Most airline pilots actually fly less than 70 hours a month and, although they have additional nonflying duty hours, usually only work 16 days a month. However, the majority of flights involve layovers away from home. When pilots are away from home, the airlines provide hotel accommodations and an allowance for expenses. Airlines operate flights at all hours of the day and night, so work schedules often are irregular. Pilots who have little seniority

Before takeoff, pilots make sure that all equipment is working properly.

may be assigned night or early morning flights.

Pilots employed outside the airlines often have irregular schedules; they may fly 30 hours one month and 90 hours the next. Since these pilots frequently have many nonflying responsibilities, they have much less free time than airline pilots. With the exception of business pilots, most pilots employed outside the airlines do not remain away from home overnight. They may work odd hours, however. Instructors, for example, often give lessons at night or on weekends.

Although flying does not involve much physical effort, the mental stress of being responsible for a safe flight, no matter what the weather, can be very tiring. Particularly during takeoff and landing, pilots must be alert and ready to act if something goes wrong.

Places of Employment

About 76,000 civilian pilots worked full time in 1978. About one-half worked for the airlines. Many of the others worked as flight instructors at local airports or for large businesses that use their own airplanes to fly company cargo and executives. Some pilots flew small planes for air taxi companies, usually flying passengers to or from lightly traveled airports not serviced by the airlines. Others worked for a variety of businesses performing tasks such as crop dusting, inspecting pipelines, or conducting sightseeing trips. Federal, State, and local governments also employed pilots.

Most pilots work at the major airports located close to cities. In fact, over one-third of all pilots work near seven metropolitan areas—Los Angeles, San Francisco, New York, Dallas-Fort Worth, Chicago, Miami, and Atlanta.

Training, Other Qualifications, and Advancement

All pilots who are paid to transport passengers or cargo must have at least a commercial pilot's license from the FAA. To qualify for this license, applicants must be at least 18 years old and have at least 250 hours of flight experience. They also must pass a strict physical examination to make sure that they are in good health and have 20/20 vision with or without glasses, good hearing, and no physical handicaps that could impair their performance. Applicants must pass a written test that includes questions on the principles of safe flight, navigation techniques, and FAA regulations. They also must demonstrate their flying ability to FAA examiners.

In addition to a commercial license, pilots who have to fly in bad weather must be licensed by the FAA to fly by instruments. Pilots may qualify for this license by having 40 hours of experience flying by instruments, passing a written examination on procedures and FAA regulations covering instrument flying, and demonstrating their ability to fly by instruments.

Airline pilots must fulfill additional requirements. They must pass FAA written and flight examinations to earn a flight engineer's license. Captains must have an airline transport pilot's license. Applicants for this license must be at least 23 years old and have a minimum of 1,500 hours of flying experience including night and instrument flying.

All licenses are valid as long as a pilot can pass the required physical examinations and the periodic tests of flying skills demanded by government and company regulations.

Flying can be learned in military or civilian flying schools. Either kind of training satisfies the flight experience requirements for licensing, but persons serving in the Armed Forces have the opportunity to gain the substantial experience on jet aircraft that is preferred by airlines and many businesses.

Pilots hired by airlines must be high school graduates; however, most airlines require 2 years of college and prefer to hire college graduates. Because pilots must be able to make quick decisions and accurate judgments under pressure, airline companies give all applicants psychological tests and reject those who do not pass.

New airline pilots usually start as flight engineers. Although airlines favor applicants who already have a flight engineer's license, they may train those who have only the commercial license. All new pilots receive several weeks of intensive training in simulators and classrooms before being assigned to a flight.

Companies other than airlines generally do not require as much flying experience. However, a commercial pilot license is required and companies prefer applicants who have experience in the type of plane they will be flying. New employees generally start as copilots.

Advancement for all pilots generally is limited to other flying jobs. Many pilots start as flight instructors, building up their flying hours while they teach. As they become more experienced, these pilots occasionally may have the opportunity to fly charter planes and perhaps get jobs with small air transportation firms such as air taxi companies. Some advance to business flying jobs. A small number get flight engineer jobs with the airlines.

In the airlines, advancement usually depends on seniority provisions of union contracts. After 5 to 10 years, flight engineers advance according to seniority to copilot and, after 10 to 20 years, to captain. Seniority also determines which pilots get the more desirable routes. In a nonairline job, a copilot may advance to pilot and, in large companies, to chief pilot in charge of aircraft scheduling, maintenance, and flight procedures.

Employment Outlook

Employment of pilots is expected to increase faster than the average for all occupa-

tions through the 1980's. In addition to the jobs created by employment growth, openings will result as experienced pilots die or retire. Competition for job openings should be keen, however, because the number of qualified pilots seeking jobs is expected to exceed the number of openings.

The expected growth in airline passenger and cargo traffic will create a need for more airliners and more pilots to fly them. But more than half the openings for pilots will occur outside the airlines. Businesses are expected to operate an increasing number of planes and employ more pilots to fly executives and cargo to locations that the scheduled airlines do not service. More flight instructors also will be needed to train new pilots.

Because wages are lower outside of the airlines, there is not as much competition for pilot jobs. Still, flying is a popular activity, so there usually are more applicants than openings even for these positions.

Recent college graduates who have experience flying jet aircraft and who have a commercial pilot's license and a flight engineer's license can expect first consideration for jobs with the major airlines. Businesses generally have fewer formal education and experience requirements than airlines. However, these companies prefer applicants with experience in the type of plane they will be flying on the job.

Earnings

Earnings of airline pilots are among the highest in the Nation. In 1978, the average salary for airline pilots was $57,000 a year. Starting salaries for flight engineers averaged $14,400 a year, while some senior captains on the largest aircraft earned as much as $110,000. Earnings depend on factors such as the type, size, and speed of the plane, and the number of hours and miles flown. Extra pay is given for night and international flights.

Airline pilots generally are eligible for life and health insurance plans. They also receive retirement benefits and, if they fail their FAA physicals, disability payments. Some airlines provide allowances to pilots for purchasing and cleaning their uniforms. As an additional benefit, pilots and their immediate families usually are entitled to a limited amount of reduced fare transportation on their own and other airlines.

According to a survey by a business aircraft association, earnings of business pilots ranged from $12,000 for copilots on small planes to $60,000 for some chief pilots of companies with large jets. Average salaries of business pilots were $19,000 for those flying light piston planes, $24,500 for light turboprop planes, $29,000 for heavy turboprop planes, and $34,000 for jet aircraft. Business pilots usually are eligible for the same benefits as other employees of their company.

According to a survey by an air transportation association, flight instructors working for air taxi companies averaged $7 an hour. Pilots in these companies averaged $8 an hour. Benefits in air taxi companies vary widely. Some of the large firms offer health and life insurance as well as pension plans to their employees. Some smaller companies offer none of these.

Most airline pilots are members of the Air Line Pilots Association, International. Those employed by one major airline are members of the Allied Pilots Association. Many flight engineers are members of the Flight Engineers' International Association.

Related Occupations

Helicopter pilots need skills and perform duties similar to those of airplane pilots. Although they are not in the cockpit, air traffic controllers and dispatchers also play an important role in making sure flights are safe and on schedule, and participate in many of the decisions pilots must make.

Sources of Additional Information

Information about job opportunities in a particular airline, and the qualifications required, may be obtained by writing to the personnel manager of the airline. Addresses of airline companies are available in the booklet *The People of the Airlines*. For a copy, write to:

Public Relations Department, Air Transport Association of America, 1709 New York Ave. NW., Washington, D.C. 20006.

For information about the duties, as well as the physical and educational requirements for airline pilots, contact:

Aviation Education Program Division, Department of Transportation, Federal Aviation Administration, 800 Independence Ave. SW., Washington, D.C. 20591.

For information about job opportunities in companies other than airlines, consult the classified section of aviation trade magazines and apply to companies that operate aircraft at local airports.

Anthropologists

(D.O.T. 055.067 and 090.227-010)

Nature of the Work

Anthropologists study people—their evolution and physical characteristics, and the cultures they create. The domain is broad; anthropologists study people's traditions, beliefs, customs, languages, material possessions, social relationships, and value systems. They generally concentrate in one of four subfields: Cultural anthropology, archeology, linguistics, or physical anthropology.

Most anthropologists specialize in cultural anthropology, sometimes called ethnology. *Ethnologists* study the customs, culture, and social life of groups, and may spend months or years living with a group to learn about its way of life. These anthropologists may learn another language or adopt new customs while observing and studying a group. Ethnographic research may focus on a particular institution or aspect of group life such as kinship, personality, art, law, religion, economics, or ecological adaptation. The field lends itself to comparative studies, such as those on different societies' attitudes towards old age. In recent years, ethnologists have ventured beyond their traditional concern with nonindustrialized societies. More and more, their research deals with groups found in modern urban societies: Ghetto inhabitants, drug addicts, politicians, and business leaders, for example.

Archeologists study cultures from artifacts and other remains in the ground. Using scientific techniques for dating and analyzing everything they find, archeologists gather and examine the remains of homes, tools, clothing, ornaments, and other evidences of human life and activity to reconstruct the inhabitants' history and customs. Archeological fieldwork takes place wherever people once lived. Sites are found in all parts of the world, and they span many centuries—from ancient times up to the present. In a desert in New Mexico, for example, archeologists have uncovered an ancient kiva—an Indian religious chamber. In a cave by the Dead Sea, they have found pieces of ancient scrolls several thousand years old. Extensive excavations at the huge Cahokia site just across the Mississippi River from St. Louis have permitted reconstruction of the Indian town as it appeared in the 12th century and provided clues as to the social and economic life of the inhabitants. In recent years, support has grown for archeological study of relatively modern communities—American colonial settlements and 19th century industrial towns, for example.

Linguistic anthropologists study the role of language in various cultures. They examine the sounds and structure of a society's language and relate these to people's behavior and thought patterns. Their research tells us, for example, that the way people use language may influence the way they think about things.

Physical anthropologists are concerned with humans as biological organisms. They study the evolution of the human body and look for the earliest evidence of human life. They also do research on racial groups and may explore, for example, the effect of heredity and environment on different races. Their work requires extensive training in anatomy, biology, chemistry, genetics, and the study of primates (the order of mammals that includes humans, apes, and monkeys). A physical anthropologist might study children's growth and development or teach a chimpanzee to communicate with sign language. A knowledge of body structure enables these anthropologists to work as consultants on projects as diverse as the design of military equipment and the sizing of clothing. *Anthropometrists* specialize in the measurement of the body or skeleton.

These archeologists are discussing discoveries made during a recent trip to Africa.

Anthropologists, like other social scientists, are research-oriented. Most, however, combine fieldwork or other forms of anthropological research with other activities: Teaching, writing, consulting, or administering programs. Moreover, a growing number of anthropologists specialize in *applied anthropology*; they concern themselves first and foremost with practical applications for research findings. *Medical anthropologists*, for example, may study cultural attitudes towards medicine and health care to help formulate a health program for a particular group. Some medical schools hire medical anthropologists as instructors. *Urban anthropologists* study complex, industrialized societies and examine the influence of city life upon people and their institutions. Some anthropologists work with architects, designers, and land use experts in planning community development projects. Others advise social service agencies; their cross-cultural insights enable them to help improve the delivery of health, counseling, nutritional, and other services to particular population groups. Still other anthropologists use their knowledge of ethnic customs and values to help educators improve the effectiveness of classroom teaching and increase parental involvement. The advice of anthropologists has been sought in the planning of bilingual education programs, for example.

Preparing cultural environmental impact statements is an increasingly important activity for anthropologists, as it is for other social scientists. In many communities, environmental protection and historic preservation laws require local authorities to identify historic areas which may be affected by development or renovation plans. Typically, those proposing to build something new or demolish something old are required to suggest ways of avoiding or lessening any adverse impacts. Generally, the research and writing involved in preparing an impact statement are done on a consultant basis by anthropologists associated with museums, colleges and universities, research institutes, or private consulting firms. In some cases, anthropologists are hired by highway commissions or planning departments to prepare impact statements.

Working Conditions

Dividing their time among teaching, research, and administrative responsibilities, anthropologists employed by colleges and universities have flexible work schedules. On the other hand, anthropologists working in government agencies and private firms have much more structured work schedules. Anthropologists often work alone behind a desk, reading, analyzing data, and writing up the results of their research. Many experience the pressures of deadlines, tight schedules, and heavy workloads, and sometimes must work overtime. Their routine may be interrupted by numerous telephone calls, letters, special requests for information, meetings, or conferences.

Only when anthropologists participate in field research do their working conditions differ. Under these circumstances, they are an integral part of a research team. Fieldwork may require traveling to remote areas, working under adverse weather conditions, living in primitive housing, and adjusting to different cultural environments. Physical stamina is important because anthropologists doing fieldwork may have to lift equipment, walk considerable distances, and spend long hours digging. In other words, fieldwork can be arduous physical labor—relieved, however, by the hope that some new insight into human society may result.

Places of Employment

About 7,000 persons worked as anthropologists in 1978. About 4 out of 5 anthropologists work in colleges and universities, where they teach and do research and consulting work. (More detailed information may be found in the *Handbook* statement on college and university faculty.)

The Federal Government employs several hundred anthropologists, chiefly in the Departments of Interior, State, Agriculture, and the Army, and in the Smithsonian Institution. Anthropologists who work for State and local governments are primarily involved in community development planning, health planning, archeological research, and historic preservation. A number of them have administrative jobs in museums.

Some anthropologists work for consulting firms or operate their own consulting services. They conduct research and prepare proposals for government agencies, community organizations, citizens' groups, and business firms. Some consultants specialize in overseas development projects.

Training, Other Qualifications, and Advancement

Students who want to become anthropologists should obtain the Ph. D. degree. College graduates with bachelor's degrees often get temporary positions and assistantships in graduate departments where they are working for advanced degrees. A master's degree, plus field experience, is sufficient for many beginning professional positions, but promotion to top positions generally is reserved for individuals who have a Ph. D. degree. Colleges and universities require a Ph. D. for permanent teaching appointments. Persons with a master's or bachelor's degree in anthropology may qualify for research and administrative positions in government and private firms.

A student interested in anthropology should acquire a broad background in the social and physical sciences and in languages. Mathematics, statistics, and computer sci-

ence are increasingly important research tools. Undergraduates may begin their field training in archeology by arranging, through their university departments, to accompany expeditions as laborers or to attend field schools established for training. They may later become supervisors in charge of the digging or collection of material and finally may direct a portion of the work of the expedition. Ethnologists and linguists usually do their fieldwork independently. Most anthropologists base their doctoral dissertations on data collected through field research; they are therefore experienced fieldworkers by the time they earn the Ph. D. degree.

The Federal Government generally requires a college degree with 24 semester hours in anthropology for entry level positions as anthropologists and 20 semester hours in anthropology, including one course in American archeology, for archeologists. However, because competition for Federal jobs is keen, additional education or experience may be required.

Over 300 colleges and universities have bachelor's degree programs in anthropology; some 160 offer master's degree programs and about 90, doctoral programs. The choice of a graduate school is very important. Students interested in museum work should select a school associated with a museum that has anthropological collections. Similarly, those interested in archeology either should choose a university that offers opportunities for summer experience in archeological fieldwork or attend an archeological field school elsewhere during summer vacations.

Interdisciplinary studies are an important part of an anthropologist's professional training, for anthropology embraces all aspects of life and overlaps many other disciplines, each with its own tradition and body of knowledge. To bring anthropological insights to bear on projects centered in another discipline—bilingual education is a good example—the anthropologist may have to learn theory and techniques from another field. For this reason, some departments of anthropology are combined with other departments such as sociology or geography.

Some anthropology students seek to broaden their employment possibilities by pursuing courses or degrees in other areas including law, medicine, public administration, and education.

Anthropologists should have a special interest in natural history and social studies and enjoy reading, research, and writing. Creativity and intellectual curiosity are essential to success in this field. In addition, anthropologists must be objective and systematic in their work. Perseverance is essential, particularly for archeologists who may spend years accumulating and piecing together artifacts from ancient civilizations. The ability to analyze data and think logically also is important. Anthropologists must be able to speak and write well to communicate the results of their work effectively.

Employment Outlook

Employment of anthropologists is expected to increase about as fast as the average for all occupations through the 1980's. However, nearly all of the anticipated employment growth will occur in nonacademic jobs—notably in consulting firms, research institutes, corporations, and Federal, State and local government agencies. Among the factors contributing to growth in the occupation is environmental, historic, and cultural resource preservation legislation. This is expected to create opportunities for various kinds of anthropologists to work full time or on a temporary contract basis for consulting firms, government agencies, academic institutions, and museums. Growing interest in ethnic studies may spur demand for anthropological research in that area.

College and university teaching, which will remain the largest area of employment for anthropologists, is likely to experience little growth due to the projected slowdown in college enrollments.

The number of qualified anthropologists seeking to enter the field is expected to exceed available positions. As a result, doctorate holders may face keen competition through the 1980's, particularly for jobs in colleges and universities. Some are expected to accept temporary appointments with little or no hope of gaining tenure. Graduates with master's degrees are expected to face very keen competition, although some may find jobs in junior colleges and government and private agencies. The few bachelor's degree holders who do find jobs as anthropologists may have very limited advancement opportunities within the profession. Some teaching positions may be available in high schools for those who meet State certification requirements.

Overall, specialties offering the best employment prospects include archeology and physical, medical, and urban anthropology.

Earnings

According to the 1977-78 College Placement Council Salary Survey, bachelor's degree candidates in the social sciences received offers averaging around $10,700 a year; master's degree candidates in the social sciences, around $13,200.

Based on limited information, starting salaries in private industry and government for anthropologists with a Ph. D. degree were generally about $18,000 a year in 1978. Master's degree holders generally started at $15,000 to $18,000 a year.

The results of a 1978 American Anthropological Association survey of departments of anthropology included data on faculty salaries. The average beginning salary for new faculty members without full-time teaching experience was in the range of $14,000 to $15,000 for persons with a Ph. D. and $11,500 to $13,500 for persons without a Ph. D. Faculty salaries varied widely but generally were lower in departments granting only bachelor's degrees than in departments granting graduate degrees. Most professors earned from $18,000 to over $30,000 a year; associate professors, $15,000 to $27,000; assistant professors, $12,000 to $24,000; and instructors, $12,000 to $18,000.

The Federal Government recognizes education and experience in certifying applicants for entry level positions. Anthropologists having a bachelor's degree could begin at $10,507 or $13,014 a year in 1979, depending upon the applicant's academic record and experience. The starting salary for those having a master's degree generally was $15,920 a year; for those having a Ph. D., $19,263. Anthropologists in the Federal Government averaged around $31,200 in 1978; archeologists, around $17,900.

Many anthropologists in colleges and universities supplement their regular salaries with earnings from other sources such as summer teaching, research grants, and consulting fees.

Related Occupations

Like anthropologists, people in several other occupations are concerned with understanding how social institutions operate. Among them are economists, geographers, historians, political scientists, psychologists, sociologists, urban planners, marketing research workers, and newspaper reporters.

Sources of Additional Information

For information about careers (including opportunities for contract work in archeology and historic preservation and State employment opportunities for archeologists); job openings; grants and fellowships; and schools that offer training in anthropology, contact:

The American Anthropological Association and the Society for American Archeology, 1703 New Hampshire Ave. NW., Washington, D.C. 20009.

For information on careers and fieldwork opportunities in archeology, contact:

The Archeological Institute of America, 53 Park Place, New York, N.Y. 10007.

Architects

(D.O.T. 001.061-010)

Nature of the Work

Attractive buildings and their surroundings enhance a community's appearance. But buildings must be safe as well as attractive and suit the needs of the people who use them. Architects take all these things into consideration and design buildings that are esthetically appealing, safe, and functional.

Architects provide a wide variety of professional services to individuals, organizations, corporations, or government agencies planning a building project. Architects are

involved in all phases of development of a building or project, from the initial discussion of general ideas through construction. Their duties require a variety of skills—design, engineering, managerial, and supervisory.

The architect and client first discuss the purposes, requirements, and cost of a project. The architect then prepares schematic drawings that show the scale and the structural and mechanical relationships of the building.

If the schematic drawings are accepted, the architect develops a final design showing the floor plans and the structural details of the project. For example, in designing a school, the architect determines the width of corridors and stairways so that students may move easily from one class to another; the type and arrangement of storage space, and the location and size of classrooms, laboratories, lunchroom or cafeteria, gymnasium, and administrative offices.

Next the architect prepares working drawings showing the exact dimensions of every part of the structure and the location of plumbing, heating units, electrical outlets, and air-conditioning.

Architects also specify the building materials and, in some cases, the interior furnishings. In all cases, the architect must ensure that the structure's design and specifications conform to local and State building codes, zoning laws, fire regulations, and other ordinances.

Throughout this time, the architect may make changes to satisfy the client. A client may, for example, decide that an original design is too expensive and ask the architect to make modifications. Or the client may change the project requirements. Redesigning plans to suit the client requires flexibility, and sometimes considerable patience, on the part of the architect.

After all drawings are completed, the architect assists the client in selecting a contractor and negotiating the construction contract. As construction proceeds, the architect visits the building site from time to time to ensure that the contractor is following the design and using the specified materials. The architect also checks to be sure that work meets the specified standards. The job is not complete until construction is finished, all required tests are made, construction costs are paid, and guarantees are received from the contractor.

Architects design a wide variety of structures, such as houses, churches, hospitals, office buildings, and airports. They also design multibuilding complexes for urban renewal projects, college campuses, industrial parks, and new towns. Besides designing structures, architects also may help in selecting building sites, preparing cost and land-use studies, and long-range planning for site development.

When working on large projects or for large architectural firms, architects often specialize in one phase of the work, such as designing or administering construction contracts. This often requires working with engineers, urban planners, landscape architects, and others.

Working Conditions

Most architects spend a great deal of their time at the drawing board in well-equipped offices. It is at the drawing board that architects do most of their more creative and imaginative work, so much of the time can be very satisfying and rewarding. This work often is varied by interviewing clients and contractors and discussing the design, construction procedures, or building materials of a project with other architects, landscape architects, or engineers. Contract administrators frequently work outdoors during inspections at construction sites.

Places of Employment

About 54,000 architects were employed in 1978. This included architecture school graduates who have not become registered (licensed), although they work in the field. They must work under the supervision of licensed architects.

Most architects work for architectural firms or for builders, real estate firms, or other businesses that have large construction programs. Some work for government agencies responsible for housing, planning, or community development. About 1,600 architects work for the Federal Government, mainly for the Departments of Defense, Interior, Housing and Urban Development, and the General Services Administration.

Although found in many areas, a large proportion of architects are employed in seven cities: Boston, Chicago, Los Angeles, New York, Philadelphia, San Francisco, and Washington.

Training, Other Qualifications, and Advancement

All States and the District of Columbia require individuals to be licensed before they may call themselves architects or contract for providing architectural services. To qualify for the licensing exam, a person must have either a Bachelor of Architecture degree followed by 3 years of acceptable practical experience in an architect's office or a Master of Architecture degree followed by 2 years of experience. As a substitute for formal training, most States accept additional experience (usually 12 years) and successful completion of a qualifying test for admission to the licensing examination. Many architecture school graduates work in the field even though they are not licensed. However, a registered architect is required to take legal responsibility for all work.

In 1978, the National Architectural Accrediting Board had accredited 87 programs of the 101 schools offering professional degrees in architecture. Most of these schools offer either a 5-year curriculum leading to a

Architects spend many hours at the drawing board.

Bachelor of Architecture degree or a 6-year curriculum leading to a Master of Architecture degree. Students also may transfer to professional degree programs after completing a 2-year junior or community college program in architecture. Many architecture schools also offer graduate education for those who already have their first professional degree. Although such graduate education is not essential for practicing architects, it often is desirable for those in research and teaching. A typical college architecture program includes courses in architectural theory, design, graphics, engineering, and urban planning, as well as in English, mathematics, physics, economics, and the humanities.

Persons planning careers in architecture should be able to work independently, have a capacity for solving technical problems, and be artistically inclined. They also must be prepared to work in the competitive environment of business where leadership and ability to work with others are important. Working for architects or building contractors during summer vacations is useful for gaining practical knowledge.

New graduates usually begin as drafters in architectural firms, where they prepare architectural drawings and make models of structures under the direction of a registered architect. After several years of experience, they may advance to chief or senior drafter responsible for all major details of a set of working drawings and for supervising other drafters. Others may work as designers, construction contract administrators, or specification writers who prepare documents that specify the building materials, their method of installation, the quality of finishes, required tests, and many other related details. Employees who become associates in their firms may receive, in addition to a salary, a share of the profits. Usually, however, the

architect's goal is to own his or her own business.

Employment Outlook

Architects are expected to face competition for jobs through the 1980's. Although employment of architects is expected to rise faster than the average for all workers during this period, the number of degrees granted in architecture is expected to continue growing as well. If so, supply in this small field could exceed the number of job openings arising from employment growth, deaths, and retirements.

Demand for architects is highly dependent upon the level of new construction, and the anticipated rapid growth of nonresidential construction is expected to be a major determinant of job opportunities through the 1980's. Any significant upswing or downturn in building could temporarily alter demand, however. Indeed, the cyclical nature of construction activity leads some architects to move in and out of the field from time to time. Their design skills and familiarity with building materials and techniques enable them to move into related areas such as graphic design, advertising, visual arts, product design, construction contracting and supervision, and real estate.

Although most job openings will be in architectural firms, some will occur in construction firms, colleges and universities, and government agencies. Construction firms employ architects to oversee various aspects of project design and actual construction. In colleges and universities, the anticipated increase in enrollments in architecture and environmental design programs may create a demand for additional faculty. Public concern about the quality of the environment is expected to heighten the demand for community and environmental planning projects. This should create opportunities in consulting firms and planning agencies of various kinds. (See the statement on urban planners elsewhere in the *Handbook*.)

Earnings

The average salary for architects in 1978 was well over $25,000, according to the limited information available. Architects with well-established private practices generally earn much more than even highly paid salaried employees of architectural firms. Although the range in their incomes is very wide, some architects with many years of experience and good reputations earn well over $40,000 a year. Architects starting their own practices may go through a period when their expenses are greater than their income. Annual income may fluctuate due to changing business conditions.

In 1979, the average salary for architects working in the Federal Government was about $25,000.

Related Occupations

Architects are concerned with the design and construction of buildings and related structures. Others who engage in related work are building contractors, civil engineers, urban planners, interior designers, industrial designers, landscape architects, drafters, and surveyors.

Sources of Additional Information

General information about careers in architecture, including a catalog of publications, can be obtained from:

The American Institute of Architects, 1735 New York Ave. NW., Washington, D.C. 20006.

Information about careers and schools in architecture is available from:

The Association of Collegiate Schools of Architecture, Inc., 1735 New York Ave. NW., Washington, D.C. 20006.

Information about the licensing examinations can be obtained from:

The National Council of Architectural Registration Boards, 1735 New York Ave. NW., Suite 700, Washington, D.C. 20006.

Astronomers

(D.O.T.021.067-010)

Nature of the Work

Astronomers seek answers to questions about the fundamental nature of the universe, such as its origin and history and the evolution of our solar system. Astronomers —sometimes called *astrophysicists*—use the principles of physics and mathematics to study and determine the behavior of matter and energy in distant galaxies. One application of the information they gain is to prove or disprove theories of the nature of matter and energy such as Einstein's theory of relativity.

To make observations of the universe, astronomers use large telescopes, radiotelescopes, and other instruments that can detect electromagnetic radiation from distant sources. Astronomers of today seldom observe stars visually through telescopes because photographic and electronic light-detecting equipment is more effective with dim or distant stars and galaxies. By using spectroscopes to analyze light from stars, astronomers can determine their chemical composition. Astronomers also use radiotelescopes and other electronic means to observe radio waves, X-rays, and cosmic rays. Computers are used to analyze data and to solve complex mathematical equations that astronomers develop to represent various theories. Computers also are useful for processing astronomical data to calculate orbits of asteroids or comets, guide spacecraft, and work out tables for navigational handbooks.

Astronomers usually specialize in one of the many branches of the science such as instruments and techniques, the Sun, the solar system, and the evolution and interiors of stars or galaxies.

Astronomers who work on observational programs begin their studies by deciding what stars or other objects to observe and the methods and instruments to use. They may need to design optical measuring devices to attach to the telescope to make the required measurements. After completing their observations, they analyze the results, present them in precise numerical form, and explain them on the basis of some theory. Astromomers usually spend relatively little time in actual observation and relatively more time in analyzing the large quantities of data that observatory facilities collect.

Some astronomers concentrate on theoretical problems and seldom visit observatories. They formulate theories or mathematical models to explain observations made earlier by other astronomers. These astronomers develop mathematical equations using the laws of physics to compute, for example, theoretical models of the internal structure of stars, and how stars change as they grow older and exhaust the energy sources deep in their interiors.

Almost all astronomers do research or teach; those in colleges and universities often do both. In schools that do not have separate departments of astronomy or only small enrollments in the subject, they often teach courses in mathematics or physics as well as astronomy. Some astronomers administer research programs, develop and design astronomical instruments, and do consulting work.

Working Conditions

Most astronomers spend the majority of their time working in offices or classrooms, although astronomers who make observations may need to travel to the observing facility and frequently work at night. Astronomers are often under considerable pressure to produce research results which are of publishable quality. In some universities, relatively new astronomers who do not produce significant research results are not granted tenure, which is in effect a permanent, secure position. Those not granted tenure face the possibility of losing their jobs.

Places of Employment

Astronomy is the smallest physical science; fewer than 2,000 persons worked as astronomers in 1978. Most astronomers work in colleges and universities. Some work in observatories operated by universities, nonprofit organizations, and the Federal Government.

The Federal Government employed almost 550 astronomers and space scientists in 1978. Most worked for the National Aeronautics and Space Administration. Others worked for the Department of Defense, mainly at the U.S. Naval Observatory and the U.S. Naval Research Laboratory. A few astronomers worked for firms in the aerospace field, or in museums and planetariums.

Astronomer giving lecture in a planetarium.

Training, Other Qualifications, and Advancement

The usual requirement for a job in astronomy is a Ph. D. degree. Persons with less education may qualify for some jobs related to astronomy, but higher level positions in teaching and research and advancement in most areas are open only to those with the doctorate.

Many students who undertake graduate study in astronomy have a bachelor's degree in astronomy. In 1978, about 50 colleges and universities had programs leading to the bachelor's degree in astronomy. However, students with a bachelor's degree in physics, or in mathematics with a physics minor, usually also can qualify for graduate programs in astronomy.

About 50 universities offer the Ph. D. degree in astronomy. These programs include advanced courses in astronomy, physics, and mathematics. Some schools require that graduate students spend several months working at an observatory. In most institutions, the work program leading to the doctorate is flexible and allows students to take courses in their own area of interest.

Persons planning careers in astronomy should have great interest and ability in science and mathematics, as well as imagination and an inquisitive mind. Perseverance and the ability to concentrate on detail and to work independently also are important.

New graduates with a doctorate may work for several years on a postdoctoral fellowship, doing research and gaining further research experience before obtaining a permanent position. A postdoctoral fellowship provides an opportunity to gain additional qualification in astronomical research. It also provides employment while looking for a permanent job. Other new Ph. D.'s, however, enter teaching or research jobs immediately after attaining their degree.

Employment Outlook

Persons seeking positions as astronomers will face keen competition for the few available openings expected through the 1980's. Employment of astronomers is expected to grow slowly, if at all, because the funds available for basic research in astronomy, which come mainly from the Federal Government, are not expected to increase enough to create many new positions. Most openings will occur as replacements for those who die or retire. Since astronomy is such a small profession, there will be few openings arising from the need for replacements. There will be keen competition for these openings because the number of degrees granted in astronomy probably will continue to exceed available openings.

Earnings

Astronomers have relatively high salaries, with average earnings more than twice the average earnings for nonsupervisory

In the Federal Government in 1979, astronomers holding the Ph. D. degree could begin at $19,263 or $23,087, depending on their college record. The average annual salary for astronomers and space scientists in the Federal Government was over $33,000 in 1978. Astronomers teaching in colleges and universities received salaries equivalent to those of other faculty members. (See statement on college and university faculty elsewhere in the *Handbook*.)

Related Occupations

Astronomy is closely related to physics, and often is thought of as a branch of physics. Astronomy is also related to other physical sciences and mathematics.

Sources of Additional Information

For information on careers in astronomy and on schools offering training in the field, contact:

Education Office, American Astronomical Society, University of Delaware, Newark, Del. 19711.

Bank Officers and Managers

(D.O.T. 186.117-026, 038, 050, -054, -070, -074 -078, .137-010, .167-014, -050, -054, -058, and .267-018)

Nature of the Work

Practically every bank has a president who directs operations; one or more vice presidents who act as general managers or who are in charge of bank departments such as trust or credit; and a comptroller or cashier who, unlike cashiers in stores and other businesses, is an executive officer generally responsible for all bank property. Large banks also may have treasurers and other senior officers, as well as junior officers, to supervise the various sections within different departments. Banks employed over 330,000 officers and managers in 1978.

Bank officers make decisions within a framework of policy set by the board of directors and existing laws and regulations. They must have a broad knowledge of business activities to relate to the operations of their department. For example, loan officers evaluate the credit and collateral of individuals and businesses applying for a loan. Similarly, trust officers must understand each account before they invest funds to support families, send young people to college, or pay retirement pensions. Besides supervising financial services, officers advise individuals and businesses and participate in community projects.

Because banks offer many services, a wide choice of careers is available to workers who specialize.

Loan officers may handle installment, commercial, real estate, or agricultural loans. To evaluate loan applications properly, officers need to be familiar with economics, production, distribution, merchandising, and commercial law. Also, they need to know business operations and should be able to analyze an industry's financial statements.

Bank officers in trust management require knowledge of financial planning and investment for investment research and for estate and trust administration.

Operations officers plan, coordinate, and control the workflow, update systems, and strive for administrative efficiency. Careers in bank operations include electronic data

Bank officers provide personal financial assistance to customers.

processing manager and other positions involving internal and customer services.

A correspondent bank officer is responsible for relations with other banks; a branch manager, for all functions of a branch office; and an international officer, for advising customers with financial dealings abroad. A working knowledge of a foreign country's financial system, trade relations, and economic conditions is beneficial to those interested in international banking.

Other career fields for bank officers are auditing, economics, personnel administration, public relations, and operations research.

Working Conditions

Since a great deal of bank business depends on customers' impressions, officers and managers are provided attractive, comfortable offices and are encouraged to wear conservative, somewhat formal, business clothes. Bank officers and managers typically work 40 hours a week; however, attending civic functions, keeping abreast of community developments, establishing and maintaining business contacts, and similar activities are aspects of their jobs that occasionally require overtime work.

Training, Other Qualifications, and Advancement

Bank officer and management positions generally are filled by management trainees, and occasionally by promoting outstanding bank clerks or tellers. College graduation usually is required for management trainees. A business administration major in finance or a liberal arts curriculum, including accounting, economics, commercial law, political science, and statistics, serves as excellent preparation for officer trainee positions. In fact, a Master of Business Administration (MBA) in addition to a social science bachelor's degree comes closest to the "ideal" college education. However, banks do hire people with diverse backgounds such as chemical engineering, nuclear physics, and forestry to meet the needs of complex, high-technology industries with which they deal. Valuable experience may be gained through summer employment programs.

A management or officer trainee may spend a year or two learning the various banking areas before choosing a permanent position. This practice is common but not universal. A bank may hire an applicant with specific skills for a position that is clearly defined at the outset.

Persons interested in becoming bank officers should like to work independently and to analyze detailed information. They also need tact and good judgment to counsel customers and supervise employees.

Advancement to an officer or management position may come slowly in small banks where the number of positions is limited. In large banks that have special training programs, promotions may occur more quickly. For a senior officer position, however, an employee usually needs many years of experience.

Although experience, ability, and leadership are emphasized for promotion, advancement may be accelerated by special study. The American Bankers Association (ABA) offers courses, publications, and other training aids to officers on every phase of banking. The American Institute of Banking, an arm of the ABA, has long filled the same educational need among bank support personnel. (See the statement on the banking industry elsewhere in the *Handbook* for more information on these and other training programs sponsored by universities and local bankers' associations.)

Because banking is an essential part of business, well trained, experienced officers and managers may transfer to closely related positions in other areas of finance or to positions within other industries, such as manufacturing, that need individuals with banking experience.

Employment Outlook

Through the 1980's, employment of bank officers is expected to increase much faster than the average for all occupations. Rising costs due to expanded banking services and the increasing dependence on computers will require more officers to provide sound management and effective quality control. Greater international trade and investment will stimulate international and domestic banking activities, thus increasing the need for bank officers and managers. Opportunities also will arise as experienced officers leave their jobs. College graduates who meet the standards for management trainees should find good opportunities for entry positions.

Earnings

Officer trainees at the bachelor's level generally earned between $900 and $1,000 a month in 1978. Those with master's degrees started at between $1,100 and $1,300 a month. A Master of Business Administration, however, appears to be worth more in salary terms: Graduates with an MBA were offered starting salaries of $1,400 to $1,600 a month in 1978.

Salaries of senior bank officers may be several times as much as starting salaries. The actual salary level depends upon the particular position and the size and location of the bank. For officers, as well as for other bank employees, earnings are likely to be lower in small towns than in big cities.

Related Occupations

Bank officers and managers combine formal schooling with further exposure in one or more areas of banking, such as lending, to provide services for customers. Other occupations which require similar training and ability include business representatives, industrial relations directors, safety council directors, city managers, export managers, and purchasing agents.

Sources of Additional Information

See the statement on the banking industry elsewhere in the *Handbook* for additional information.

Biochemists

(D.O.T. 041.061-026)

Nature of the Work

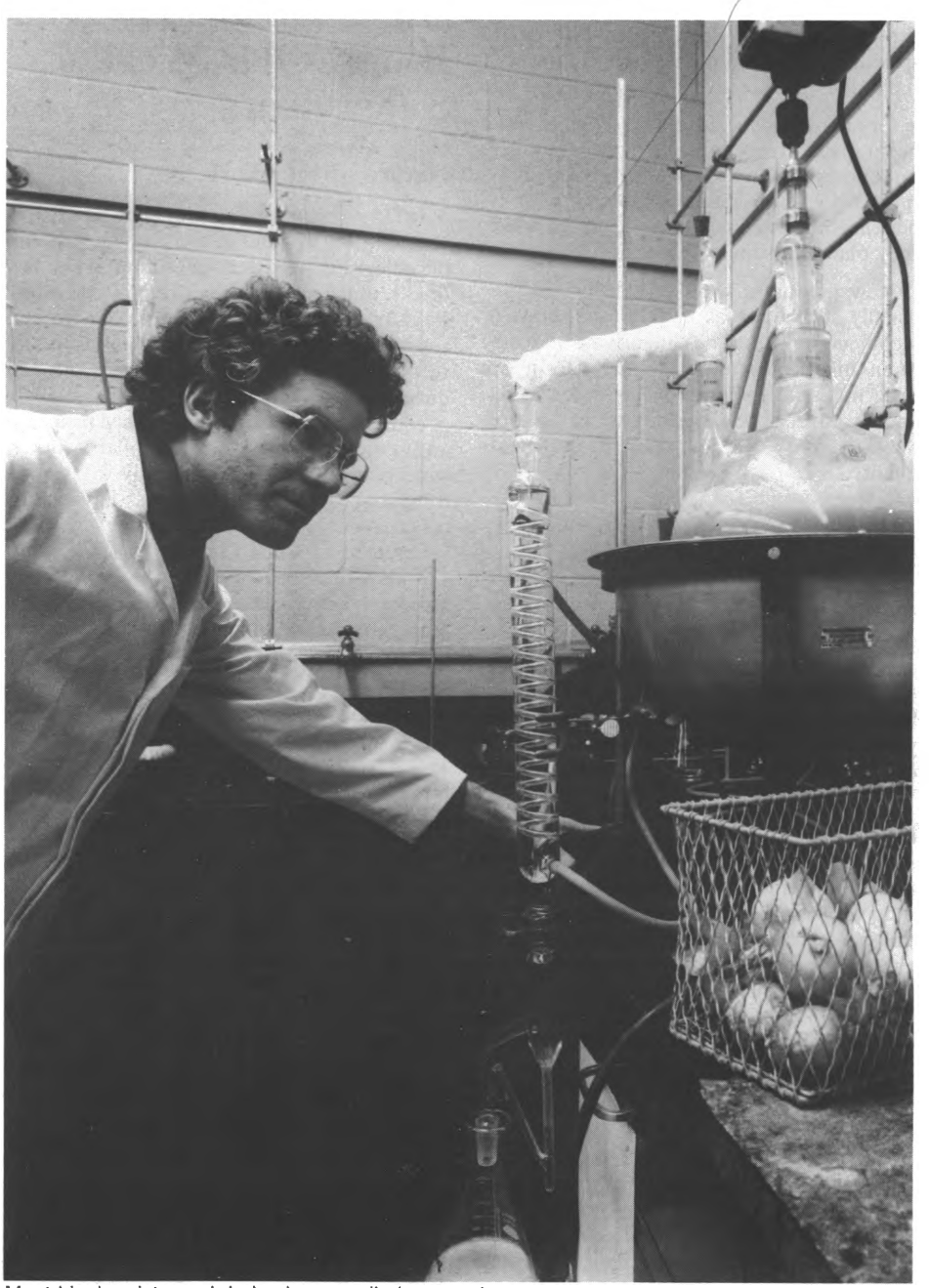
Biochemists study the chemical composition and behavior of living things. Since life is based on complex chemical combinations and reactions, the work of biochemists is vital for an understanding of reproduction, growth, and heredity. Biochemists also may study the effects of food, hormones, or drugs on various organisms.

The methods and techniques of biochemistry are applied in areas such as medicine and agriculture. For instance, biochemists may investigate causes and cures for diseases, or conduct research on transferring characteristics of one kind of plant to another.

More than 3 out of 4 biochemists work in basic and applied research activities. The distinction between basic and applied research is often one of degree, and biochemists may do both types. Most, however, are in basic research. The few doing strictly applied research use the results of basic research to solve practical problems. For example, knowledge of how an organism forms a hormone is used to synthesize and produce hormones on a mass scale.

Laboratory research involves weighing, filtering, distilling, drying, and culturing (growing microorganisms). Some experiments also require the designing and constructing of laboratory apparatus or the use of radioactive tracers. Biochemists use a variety of instruments, including electron microscopes and centrifuges, and they may devise new instruments and techniques as needed. They usually report the results of their research in scientific journals or before scientific groups.

Some biochemists combine research with teaching in colleges and universities. A few work in industrial production and testing activities.



Most biochemists work in basic or applied research.

Working Conditions

Biochemists usually work regular hours in laboratories, offices, and classrooms. Some biochemists may travel occasionally to attend meetings and conferences. Biochemists' laboratory work usually is not dangerous or unhealthy, if the proper procedures are observed.

Places of Employment

About 20,000 biochemists were employed in 1978. About one-half worked for colleges and universities and about one-fourth for private industry, primarily in companies manufacturing drugs, insecticides, and cosmetics. Some work for nonprofit research institutes and foundations; others, for Federal, State, and local government agencies. Most government biochemists do health and agricultural research for Federal agencies. A few self-employed biochemists are consultants to industry and government.

Training, Other Qualifications, and Advancement

The minimum educational requirement for many beginning jobs as a biochemist, especially in research or teaching, is an advanced degree. A Ph. D. degree is a virtual necessity for persons who hope to contribute significantly to biochemical research and advance to many management and administrative jobs. A bachelor's degree with a major in biochemistry or chemistry, or with a major in biology and a minor in chemistry, may qualify some persons for entry jobs as research assistants or technicians.

About 100 schools award the bachelor's degree in biochemistry, and nearly all colleges and universities offer a major in biology or chemistry. Persons planning careers as biochemists should take undergraduate courses in chemistry, biology, biochemistry, mathematics, and physics.

About 150 colleges and universities offer graduate degrees in biochemistry. Graduate students generally are required to have a bachelor's degree in biochemistry, biology, or chemistry. Many graduate programs emphasize one specialty in biochemistry because of the facilities or the research being done at that particular school. Graduate training requires actual research in addition to advanced science courses, so students should select their schools carefully. For the doctoral degree, the student does intensive research and a thesis in one field of biochemistry.

Persons planning careers as biochemists should be able to work independently or as part of a team. Biochemists should have analytical ability and curiosity, as well as the patience and perseverance needed to complete the hundreds of experiments necessary to solve a single problem. They should also

express themselves clearly when writing and speaking to communicate the findings of their research effectively.

Graduates with advanced degrees may begin their careers as teachers or researchers in colleges or universities. In private industry, most begin in research jobs and with experience may advance to positions in which they plan and supervise research.

New graduates with a bachelor's degree usually start work as research assistants or technicians. These jobs in private industry often involve testing and analysis. In the drug industry, for example, research assistants analyze the ingredients of a product to verify and maintain its purity or quality.

Employment Outlook

Job opportunities for biochemists with advanced degrees should be favorable through the 1980's. The employment of biochemists is expected to grow slightly faster than the average for all occupations during this period. Some additional job openings will result each year as biochemists retire, die, or transfer to other occupations.

The anticipated growth in this field should result from the effort to find cures for cancer, heart disease, and other diseases, and from public concern with environmental protection. Colleges and universities may need additional teachers if biochemistry enrollments continue to increase.

Earnings

Average earnings of biochemists were about twice the average for all nonsupervisory workers in private industry, except farming. According to a 1978 survey by the American Chemical Society, salaries for experienced biochemists averaged about $17,000 for those with a bachelor's degree; $21,000 for those with a master's degree; and $28,000 for those with a Ph. D.

Starting salaries of biochemists employed in colleges and universities are comparable to those for other faculty members. (See statement on college and university faculty elsewhere in the *Handbook*.)

Related Occupations

Biochemistry is closely related to biology and chemistry. Medical laboratory workers often use biochemical procedures in their work, and physicians, pharmacists, and other health practitioners need to know a great deal about biochemistry.

Sources of Additional Information

For general information on careers in biochemistry, contact:

American Society of Biological Chemists, 9650 Rockville Pike, Bethesda, Md. 20014.

Blue-Collar Worker Supervisors

Nature of the Work

In any organization, someone has to be boss. For the millions of workers who assemble television sets, service automobiles, lay bricks, unload ships, or perform any of thousands of other activities, a blue-collar worker supervisor is the boss. These supervisors direct the activities of other employees and frequently ensure that millions of dollars worth of equipment and materials are used properly and efficiently. While blue-collar worker supervisors are most commonly known as foremen or forewomen, they also have many other titles. In the textile industry, they are referred to as second hands; on ships, they are known as boatswains; and in the construction industry, they are often called overseers, strawbosses, or gang leaders.

Although titles may differ, the job of all blue-collar worker supervisors is similar. They tell other employees what jobs to do and make sure the jobs are done correctly. For example, loading supervisors at truck terminals assign workers to load trucks, and then check that the material is loaded correctly and that each truck is fully used. They may mark freight bills and record the load and weight of each truck. In some cases, supervisors also do the same work as other employees. This is especially true in the construction industry where, for example, bricklayer supervisors also lay brick.

Because they are responsible for the output of other workers, supervisors make work schedules and keep production and employee records. They use judgment in planning and must allow for unforeseen problems such as absent workers and machine breakdowns. Teaching employees safe work habits and enforcing safety rules and regulations are other supervisory responsibilities. Supervisors also may demonstrate timesaving or laborsaving techniques to workers and train new employees.

In addition to their other duties, blue-collar worker supervisors tell their subordinates about company plans and policies; recommend good workers for wage increases, awards, or promotions; and deal with poor workers by issuing warnings or recommending that they be disciplined or fired. In companies where employees belong to labor unions, supervisors meet with union representatives to discuss work problems and grievances. They must know the provisions of labor-management contracts and run their operations according to these agreements.

Working Conditions

Although working conditions vary from industry to industry, most blue-collar worker supervisors work in a normal shop environment. They may be on their feet much of the time overseeing the work of subordinates and may be subjected to the noise and grime of machinery.

Since these supervisors are responsible for the work of other blue-collar workers, they may work longer hours in order to be on the job before other workers arrive and after they leave.

First-line supervisors may have some problems being in the middle between the work force and management. On the other hand, blue-collar worker supervisors may find satisfaction in having more challenging and prestigious jobs than most blue-collar workers.

Blue-collar worker supervisors tell other workers what jobs are to be done.

Places of Employment

About 1,670,000 blue-collar worker supervisors were employed in 1978. Although they work for almost all businesses and government agencies, over half of them work in manufacturing, supervising the production of cars, washing machines, and thousands of other products. Most of the rest work in the construction industry, in wholesale and retail trade, in public utilities, and transportation. Employment is distributed in much the same way as population, and jobs are located in all cities and towns.

Training, Other Qualifications, and Advancement

When choosing supervisors, employers generally look for experience, skill, and leadership qualities. Employers place emphasis on the ability to motivate employees, maintain high morale, command respect, and get along with people. Completion of high school often is the minimum educational requirement, and 1 or 2 years of college or technical school can be very helpful to workers who want to become supervisors.

Most supervisors rise through the ranks—that is, they are promoted from jobs where they operated a machine, worked on an assembly line, or at a construction craft. This work experience gives them the advantage of knowing how jobs should be done and what problems may arise. It also provides them with insight into management policies and employee attitudes towards these policies. Supervisors are sometimes former union representatives who are familiar with grievance procedures and union contracts. To supplement this work experience, many companies have training programs to help develop supervisory skills.

Although few blue-collar worker supervisors are college graduates, a growing number of employers are hiring trainees with a college or technical school background. This practice is most prevalent in industries with highly technical production processes, such as the chemical, oil, and electronics industries. Employers generally prefer backgrounds in business administration, industrial relations, mathematics, engineering, or science. The trainees undergo on-the-job training until they are able to accept supervisory responsibilities.

Outstanding supervisors, particularly those with college education, may move up to higher management positions. In manufacturing, for example, they may advance to jobs such as department head and plant manager. Some supervisors, particularly in the construction industry, use the experience and skills they gain to go into business for themselves.

Employment Outlook

Employment of blue-collar worker supervisors is expected to increase about as fast as the average for all occupations through the 1980's. In addition, many job openings will arise as experienced supervisors retire, die, or transfer to other occupations.

Population growth and rising incomes will stimulate demand for goods such as houses, air conditioners, TV sets, and cars. As a result, more blue-collar workers will be needed to produce these items, and more supervisors will be needed to direct their activities. Although most of these supervisors will continue to work in manufacturing, a large part of the increase in jobs will be in nonmanufacturing industries, especially in the trade and service sectors.

Earnings

In 1978, average annual earnings of blue-collar worker supervisors who worked full time were about $18,000, approximately one and one-half times the average for all nonsupervisory workers in private industry, except farming. Supervisors usually are salaried. Their salaries generally are determined by the wage rates of the highest paid workers they supervise. For example, some companies keep wages of supervisors about 10 to 30 percent higher than those of their subordinates. Some supervisors receive overtime pay.

Related Occupations

Many other workers have supervisory duties, including those who supervise professional and technical, sales, clerical, and service workers. Some of these are retail store or retail department managers; bank officers and head tellers; hotel managers, housekeepers, and assistants; postmasters and line supervisors; head cooks; head nurses; and surveyors.

Sources of Additional Information

A bibliography of career literature on management occupations is available from:

American Management Association, 135 West 50th St., New York, N.Y. 10020.

Broadcast Technicians

(D.O.T. 003.167-030 and -034; 193.167-014, .262-018 and -038; 194.262-010 and -018, .282, .362, and .382-014; 822.281-030; 962.162, .167-010, .281-014 and -018, .362-014, .384, and .665)

Nature of the Work

Broadcast technicians operate and maintain the electronic equipment used to record and transmit radio and television programs. They work with microphones, sound recorders, light and sound effects, television cameras, video tape recorders, and other equipment.

In the control room, broadcast technicians operate equipment that regulates the quality of sounds and pictures being recorded or broadcast. They also operate controls that switch broadcasts from one camera or studio to another, from film to live programming, or from network to local programs. By means of hand signals and, in television, by use of telephone headsets, they give technical directions to personnel in the studio.

When events outside the studio are to be broadcast, technicians may go to the site and set up, test, and operate the equipment. After the broadcast, they dismantle the equipment and return it to the station.

As a rule, broadcast technicians in small stations perform a variety of duties. In large stations and in networks, on the other hand, technicians are more specialized, although specific job assignments may change from day to day. *Transmitter technicians* monitor and log outgoing signals and are responsible for transmitter operation. *Maintenance technicians* set up, maintain, and repair electronic broadcasting equipment. *Audio control technicians* regulate sound pickup, transmission, and switching, and *video control technicians* regulate the quality, brightness, and contrast of television pictures. The lighting of television programs is directed by *lighting technicians*. For programs originating outside the studio, *field technicians* set up and operate broadcasting equipment. *Recording technicians* operate and maintain sound recording equipment; *video recording technicians* operate and maintain video tape recording equipment. Some technicians operate equipment designed to produce special effects. Sometimes the term "operator" or "engineer" is substituted for "technician."

Supervisory personnel with job titles such as *chief engineer* or *transmission engineer* direct activities concerned with the operation and maintenance of studio broadcasting equipment.

Working Conditions

Broadcast technicians generally work indoors in pleasant surroundings. Many stations are air-conditioned since transmitters and other electronic equipment must be operated at cool temperatures. Broadcasts outside the studio, however, may require technicians to work out of doors under less favorable conditions.

Network technicians may ocasionally have to work long hours under great pressure to meet broadcast deadlines.

Places of Employment

About 40,000 broadcast technicians were employed in radio and television stations in 1978. Television stations employ, on the average, many more technicians than radio stations. Although broadcast technicians are employed in every State, most are located in large metropolitan areas. The highest paying and most specialized jobs are concentrated in New York City, Los Angeles, and Washington, D.C.—the originating centers for most of the network programs.

Training, Other Qualifications, and Advancement

While broadcast technicians have some duties that do not require a high degree of training in electronics, employers prefer applicants who can handle the full range of technical duties. A person interested in becoming a broadcast technician therefore should plan to get a first class radiotelephone operator license from the Federal Communications Commission (FCC). Federal law requires that anyone who operates broadcast transmitters in television stations must hold such a license. In radio stations, technicians who maintain, repair, or adjust transmitters also need the first class license; however, in most cases, those involved in the most routine operation of transmitters only need a restricted radiotelephone operator permit, for which no examination is required. Applicants for an FCC license, however, must pass a series of written examinations. These cover construction and operation of transmission and receiving equipment; characteristics of electromagnetic waves; and regulations and practices, both Federal and international, which govern broadcasting.

Among high school courses, algebra, trigonometry, physics, electronics, and other sciences provide valuable background for persons anticipating careers in this occupation. Building and operating a radio also are good training. Taking an electronics course in a technical school is still another good way to acquire the knowledge for becoming a broadcast technician. Some persons gain work experience as temporary employees while filling in for regular broadcast technicians who are on vacation.

Many schools give courses especially designed to prepare the student for the FCC's first class license test. Technical school or college training is an advantage, particularly for those who hope to advance to supervisory positions or to the more specialized jobs in large stations and in the networks.

Broadcast technicians must have an aptitude for working with electrical and mechanical systems and equipment. Manual dexterity, the ability to perform tasks requiring precise hand skills, is necessary for success in this occupation.

Persons with FCC first class licenses who get entry jobs are instructed and advised by the chief engineer, or by other experienced technicians, concerning the work procedures of the station. They begin their careers in small stations, operating the transmitter and handling other technical duties, after a brief instruction period. As they acquire more experience and skill, they are assigned to more responsible jobs. Those who demonstrate above-average ability may move into top level technical positions such as supervisory technician or chief engineer. A college degree in engineering is becoming increasingly important for advancement to supervisory and executive positions. (See the statement on occupations in the radio and television broadcasting industry elsewhere in the *Handbook*.)

Broadcast technicians must have an aptitude for working with electrical and mechanical equipment.

Employment Outlook

People seeking beginning jobs as broadcast technicians face strong competition, especially in major metropolitan areas where the number of qualified jobseekers greatly exceeds the number of openings. Prospects for entry level positions are best in smaller cities for people with appropriate training in electronics. As is the case with other occupations in the radio and television broadcasting industry, stations in major metropolitan areas seek highly experienced personnel.

Employment of broadcast technicians is expected to increase about as fast as the average for all occupations through the 1980's. Some job openings also will result from the need to replace experienced technicians who retire, die, or transfer to other occupations.

Some new job opportunities for technicians will arise as new radio and television stations go on the air. Demand for broadcast technicians also will increase as cable television stations broadcast more of their own programs. At the same time, technological developments are likely to limit future demand; such laborsaving technical advances as automatic programming and remote control of transmitters will hold down demand for additional technicians. Technological developments such as these have shifted the emphasis from operations to maintenance work, which calls for a strong technical background.

Earnings

In 1978, technicians generally started at $140 to $150 a week in small stations, according to the limited information available. Earnings of experienced technicians were much higher. Licensed technicians who can perform the full range of tasks are, of course, the highest paid. As a rule, technicians' wages are highest in large cities and in large stations. Technicians employed by television stations usually are paid more than those who work for radio stations because television work is generally more complex. Technicians employed by educational broadcasting stations generally earn less than those who work for commercial stations.

Most technicians in large stations work a 40-hour week with overtime pay for additional hours. Broadcast technicians in small stations generally work a considerable amount of overtime. Evening, night, and weekend work frequently is necessary since many stations are on the air 24 hours a day, 7 days a week.

Related Occupations

Broadcast technicians need the knowledge and hand coordination to operate technical equipment; they generally complete specialized postsecondary training programs, including courses in science and engineering. Others whose jobs have similar requirements include drafters, engineering and science technicians, surveyors, air traffic controllers, radiologic technologists, respiratory therapy workers, electrocardiograph technicians, electroencephalographic technicians, and medical laboratory technicians.

Sources of Additional Information

For information about radiotelephone operator permits and licenses, and examination study guides, write to:

Federal Communications Commission, Policy Analysis Branch, 1919 M St. NW., Washington, D.C. 20554.

For information on careers for broadcast technicians, write to:

National Association of Broadcasters, 1771 N St. NW., Washington, D.C. 20036.

For a list of schools that offer programs or courses in broadcasting, contact:

Broadcast Education Association, National Association of Broadcasters, 1771 N St. NW., Washington, D.C. 20036.

Buyers

(D.O.T. 162.157-018 and -022; 185.167-034)

Nature of the Work

The Americans have been invited to a private showing in Paris. Representing a major New York department store, they sit with a select group in an elegantly furnished room. They watch closely as graceful models float down the runway before them to display the latest creations by the world's most famous designers. After some consultation, they make choices involving thousands, perhaps millions of dollars. All in a day's work.

The job of retail buyer often brings to mind the glamour of high fashion; indeed, many fashion buyers do lead exciting, fast-paced lives involving travel abroad. Not every buyer, however, deals in fashion. All merchandise sold in a retail store—garden furniture, automobile tires, toys, aluminum pots, and canned soups alike—appears in that store on the decision of a buyer. Although all buyers seek to satisfy their stores' customers and sell at a profit, the kind and variety of goods they purchase depend on the store where they work. A buyer for a small clothing store, for example, may purchase its complete stock of merchandise, from sportswear to formal evening clothes. Buyers who work for larger retail businesses often handle one or a few related lines of goods, such as men's wear, ladies' sportswear, or children's toys. Some, known as *foreign buyers*, purchase merchandise outside the United States.

In order to purchase the best selection of goods for their stores, buyers must be familiar with the manufacturers and distributors who handle the merchandise they need. They also must keep informed about changes in existing products and the development of new ones. To learn about merchandise, buyers attend fashion and trade shows and visit manufacturers' showrooms. They usually order goods during buying trips, and also place orders with wholesale and manufacturers' sales workers who call on them to display their merchandise.

Buyers must be able to assess the resale value of goods after a brief inspection and make a purchase decision quickly. They are aware of their stores' profit margins and try to select merchandise that will sell quickly at well above the original cost. Since most buyers work within a limited budget, they must plan their purchases to keep needed items always in stock but also allow for unexpected purchases when a "good buy" presents itself.

Because buyers purchase merchandise for their firms to resell (unlike purchasing agents who buy goods for direct use by the firm—see the statement on purchasing agents elsewhere in the *Handbook*), they must know what motivates customers to buy. Before ordering a particular line of merchandise, buyers study market research reports and analyze past sales records to determine what products are currently in demand. They also work closely with assistant buyers and sales clerks whose daily contact with customers furnishes information about consumer likes and dislikes. In addition, buyers read fashion and trade magazines to keep abreast of style and manufacturing trends; follow ads in newspapers and other media to check retail competitors' sales activities; and watch general economic conditions to anticipate consumer buying patterns.

Merchandise managers (D.O.T. 185.167-034) plan and coordinate buying and selling activities for large and medium-sized stores. They divide the budget among buyers, decide how much merchandise to stock, and assign each buyer to purchase certain goods. Merchandise managers may review buying decisions to ensure that needed categories of goods are in stock, and help buyers to set general pricing guidelines.

Buyers and merchandise managers usually have very busy schedules and deal with many different people in the course of a day. They work with manufacturers' representatives, other store personnel including store executives and sales workers, and customers. Assisting with sales promotions and creating enthusiasm among sales personnel are part of the buyer's job, and he or she may be asked to provide information, such as dress sizes and product descriptions, to the advertising department for a sales promotion, or to meet with floor sales workers before a new line of merchandise is introduced. Some buyers direct assistants who handle routine aspects of purchasing such as verifying shipments; others supervise department managers.

Some buyers represent large stores or chains in cities where many manufacturers are located. The duties of these "market representatives" vary by employer; some purchase goods, while others supply information and arrange for store buyers to meet with manufacturers when they are in town.

New technology has altered the buyer's role in retail chainstores. In the past, firms employed a buyer for each store or group of stores in a local area. Now cash registers connected to a computer, known as point-of-sale terminals, allow retail chains to maintain centralized, up-to-the-minute inventory records. With these records, a single garden furniture buyer, for example, can purchase lawn chairs and picnic tables for the entire chain.

Working Conditions

Retailing is a highly competitive business, and buyers operate under considerable pressure. Anticipating customers' preferences and ensuring that goods are in stock when they are needed is far from easy, and mistakes can be costly. The buyer's job calls for resourcefulness and good judgment, as well as the self-confidence to make decisions and take risks. However, many successful buyers feel that the stimulation and excitement the job can provide more than make up for any emotional strain.

Buyers frequently work more than a 40-hour week because of special sales, conferences, and travel. The amount of traveling a buyer does varies with the type of merchandise bought and the location of suppliers, but most spend 4 or 5 days a month on the road.

Places of Employment

In 1978, approximately 115,000 buyers and merchandise managers worked for retail firms. Although jobs for buyers are found in all parts of the country, most jobs are in major metropolitan areas where retail stores are concentrated. Market representatives work for buying offices in major market areas such as New York, Chicago, and Dallas.

Training, Other Qualifications, and Advancement

Because familiarity with the merchandise and with the retailing business itself is such a central element in the buyer's job, prior retailing experience sometimes provides sufficient preparation. Many a successful buyer began in a stockroom or behind a sales counter and worked up the ladder. High school distributive education programs have launched careers in retailing that led, eventually, to a buyer's position. (More information about distributive education appears in the statement on retail trade sales workers elsewhere in the *Handbook*.)

More and more, however, employers prefer applicants who have a college degree. Many colleges and universities offer associate degree or bachelor's degree programs in marketing and purchasing. Postsecondary training also is offered in vocational schools or technical institutes that prepare students for careers in fashion merchandising. While courses in merchandising or marketing may help in getting started in retailing, such training is not essential, as a rule. Most employers accept college graduates in any field of study and train them on the job.

In many stores, beginners who are candidates for buying jobs start out in executive training programs. These programs usually last from 6 to 8 months and combine classroom instruction in merchandising and purchasing with short rotations to various jobs

Buyers must be able to assess the resale value of goods.

in the store. This training introduces the new worker to store operations and policies, and provides the fundamentals of merchandising and management as well.

The trainee's first job is likely to be that of assistant buyer. The duties include supervising sales workers, checking invoices on material received, and keeping account of stock on hand. Assistant buyers gradually assume purchasing responsibilities, depending upon their individual abilities and the size of the department where they work. Training as an assistant buyer usually lasts at least a year. After years of working as a buyer, those who show exceptional ability may advance to merchandise manager. A few find further promotion to top executive jobs such as general merchandise manager for a retail store or chain. The length of time it takes to reach any of these levels depends not just on the individual's ability but on the store's need for management personnel. The faster the company grows, the greater the opportunity for a worker to acquire responsibility.

Buyers should be good at planning and decisionmaking and have an interest in merchandising. They need leadership ability and communications skills to supervise sales workers and assistant buyers and to deal effectively with manufacturers' representatives and store executives. Because of the fast pace and constant pressure of their work, buyers need physical stamina and emotional stability.

Employment Outlook

Employment of buyers is expected to grow about as fast as the average for all occupations through the 1980's. The rate of growth is expected to be slower than that projected for the retail trade industry as a whole, however. This mainly reflects the increased use of computerized systems to maintain inventories and to order standard items of merchandise through centralized buying. Such systems are gaining popularity among chainstores and are expected increasingly to dominate general merchandise retailing. Most job openings will arise each year from the need to replace workers who leave the occupation.

Competition for buying jobs is expected to be keen, for merchandising attracts large numbers of college graduates every year. Prospects are likely to be best for qualified applicants who enjoy the competitive nature of retailing and work best in a demanding, fast-paced job.

Earnings

Buyers for discount department stores and other mass merchandising firms are among the most highly paid in the industry, as are those who buy centrally for large chain department stores. Most earned between $23,000 and $32,000 a year in 1978, though many earned salaries outside this range. Merchandising managers earned considerably more. The actual income depends upon the product line purchased, the sales volume of the store, and the individual's seniority.

Buyers often earn large bonuses (cash gifts) for exceptional performance. In addition, many stores have incentive plans, such as profit sharing and stock options.

Related Occupations

Workers in other occupations need a knowledge of marketing and the ability to assess consumer demand; among them are comparison shoppers, manufacturers' sales representatives, insurance sales agents, wholesale trade sales representatives, and travel agents.

Sources of Additional Information

General information about a career in retailing is available from:

National Retail Merchants Association, 100 West 31st St., New York, N.Y. 10001.

Information on schools that teach retailing is available from:

U.S. Department of Education, Division of Vocational/Technical Education, Washington, D.C. 20202.

National Association of Trade and Technical Schools, 2021 K St. NW., Washington, D.C. 20006.

Chemists

(D.O.T. 022.061-010 and -014, .137-010, .161-010, and .281-014)

Nature of the Work

The clothes we wear, the foods we eat, the houses in which we live—in fact most things that help make our lives better, from medical care to a cleaner environment—result, in part, from the work done by chemists.

Chemists search for and put into practical use new knowledge about substances. Their research has resulted in the development of a tremendous variety of synthetic materials, such as nylon and polyester fabrics, ingredients that have improved other substances, and processes which help save energy and reduce pollution, such as improved oil refining methods.

Nearly one-half of all chemists work in research and development. In basic research, chemists investigate the properties and composition of matter and the laws that govern the combination of elements. Basic research often has practical uses. For example, synthetic rubber and plastics have resulted from research on small molecules uniting to form larger ones (polymerization). In research and development, new products are created or improved. The process of developing a product begins with de-

scriptions of the characteristics it should have. If similar products exist, chemists test samples to determine their ingredients. If no such product exists, experimentation with various substances yields a product with the required specifications.

Nearly one-eighth of all chemists work in production and inspection. In production, chemists prepare instructions (batch sheets) for plant workers that specify the kind and amount of ingredients to use and the exact mixing time for each stage in the process. At each step, samples are tested for quality control to meet industry and government standards. Records and reports show results of tests.

Others work as marketing or sales representatives to obtain technical knowledge of products sold. A number of chemists teach in colleges and universities. Some chemists are consultants to private industry and to government agencies.

Chemists often specialize in one of the subfields of chemistry. *Analytical chemists* determine the structure, composition, and nature of substances, and develop new techniques. An outstanding example was the analysis of moon rocks by an international team of analytical chemists. *Organic chemists* at one time studied the chemistry of only living things, but this area has been broadened to include all carbon compounds. When combined with other elements, carbon forms a vast number of substances. Many modern commercial products, including plastics and other synthetics, have resulted from the work of organic chemists. *Inorganic chemists* study compounds other than carbon. They may, for example, develop materials to use in solid state electronic components. *Physical chemists* study energy transformations to find new and better energy sources. Increasingly, however, chemists consider themselves members of new specialties that include two or more of the preceding fields. *Biochemists*, often considered as either chemists or life scientists, are discussed elsewhere in the *Handbook*. Some chemists specialize in the chemistry of foods. (See statement on food technologists elsewhere in the *Handbook*.)

Working Conditions

Chemists usually work in offices, laboratories, or classrooms. Some are exposed to health or safety hazards when handling certain chemicals, but there is little risk if proper procedures are followed. Chemists usually work regular hours and seldom travel.

Places of Employment

Over 140,000 persons worked as chemists in 1978. About one-half of all chemists work for manufacturing firms—about one-half of them are in the chemical manufacturing industry, with the rest scattered throughout other manufacturing industries.

Colleges and universities employed about 25,000 chemists in 1978. Chemists also work for State and local governments, primarily in health and agriculture, and for Federal agencies, chiefly the Department of Defense; Health and Human Services; Agriculture; and Interior. Smaller numbers worked for nonprofit research organizations.

Chemists are employed in all parts of the country, but they are concentrated in large industrial areas. Nearly one-fifth of all chemists were located in four metropolitan areas—New York, Chicago, Philadelphia, and Newark.

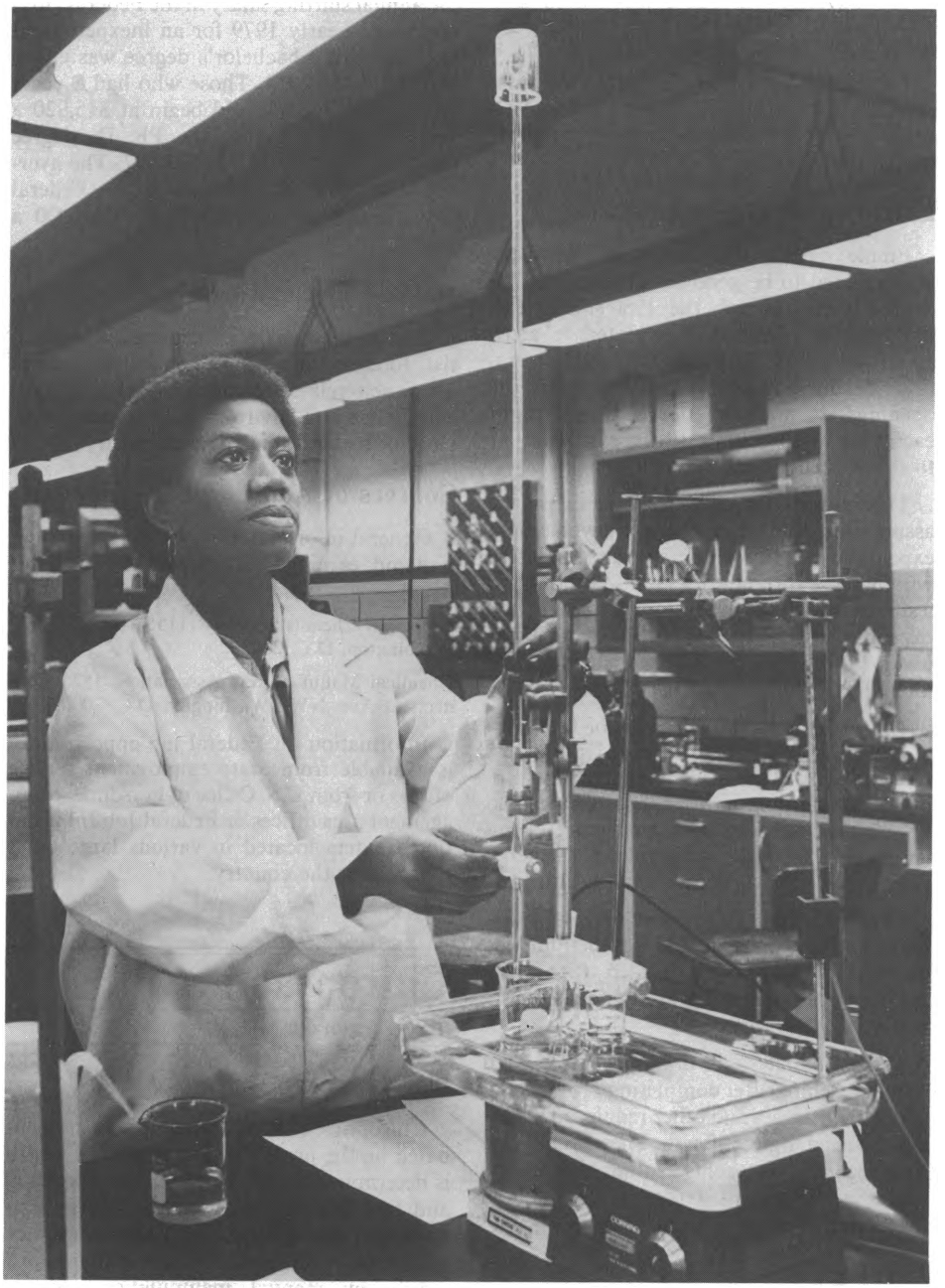
Training, Other Qualifications, and Advancement

A bachelor's degree with a major in chemistry or a related discipline is sufficient for many beginning jobs as a chemist. However, graduate training is required for many research jobs and most college teaching jobs require a Ph. D. degree. Beginning chemists should have a broad background in chemistry, with good laboratory skills.

About 1,175 colleges and universities offer a bachelor's degree in chemistry. In addition to required courses in analytical, inorganic, organic, and physical chemistry, undergraduates usually study mathematics and physics.

More than 350 colleges and universities award advanced degrees in chemistry. In graduate school, students generally specialize in a particular subfield of chemistry. Requirements for the master's and doctor's degree usually include a thesis based on independent research.

Students planning careers as chemists should enjoy studying science and mathematics, and should like working with their hands



Although many chemists spend much of their time in laboratories, chemists also work in offices, classrooms, and industrial plants.

building scientific apparatus and performing experiments. Perseverance and the ability to concentrate on detail and to work independently are essential. Other desirable assets include an inquisitive mind and imagination.

Graduates with the bachelor's degree generally begin their careers in government or industry by analyzing or testing products, working in technical sales or service, or assisting senior chemists in research and development laboratories. Some employers have special training and orientation programs which provide special knowledge needed for the employer's type of work. Candidates for an advanced degree often teach or do research in colleges and universities while working toward advanced degrees.

Beginning chemists with the master's degree can usually go into applied research in government or private industry. They also may qualify for teaching positions in 2-year colleges and some universities.

The Ph. D. generally is required for basic research, for teaching in colleges and universities, and for advancement to many administrative positions.

Employment Outlook

Employment opportunities in chemistry are expected to be good for graduates at all degree levels through the 1980's. The employment of chemists is expected to grow about as fast as the average for all occupations during this period, creating many job openings. In addition, openings will result each year as chemists retire, die, or transfer to other occupations.

This outlook for chemists is based on the assumption that research and development expenditures of government and industry will increase through the 1980's, although at a slower rate than during the 1960's. If actual expenditures differ significantly from those assumed, the outlook for chemists would be altered.

Approximately three-fourths of total employment is expected to be in private industry, primarily in the development of new products. In addition, industrial companies and government agencies will need more chemists to help solve problems related to energy shortages, pollution control, and health care.

Little growth in college and university employment is expected, and competition for teaching positions will be keen. (See statement on college and university faculty elsewhere in the *Handbook*.)

Some graduates will find openings in high school teaching after completing professional education courses and other requirements for a State teaching certificate. They usually are then regarded as teachers rather than chemists. (See statement on secondary school teachers elsewhere in the *Handbook*.)

Earnings

Earnings of chemists averaged more than twice as much as those of nonsupervisory workers in private industry, except farming. According to the American Chemical Society, salaries of experienced chemists having a bachelor's degree averaged $23,900 a year in 1978; for those with a master's degree, $25,400; and for those with a Ph. D., $29,200.

Private industry paid chemists with the bachelor's degree starting salaries averaging $13,500 a year in 1978; those with the master's degree, $15,600; and those with the Ph. D., $21,500.

In colleges and universities, the average salary of those with the master's degree was $18,100 and of those with the Ph. D., $23,400. In addition, many experienced chemists in educational institutions supplement their regular salaries with income from consulting, lecturing, and writing.

Depending on a person's college record, the annual starting salary in the Federal Government in early 1979 for an inexperienced chemist with a bachelor's degree was either $10,507 or $13,014. Those who had 2 years of graduate study could begin at $15,920 a year. Chemists having the Ph. D. degree could start at $19,263 or $23,087. The average salary for all chemists in the Federal Government in early 1979 was $26,000 a year.

Related Occupations

The occupations of biochemist, life scientist, food scientist, and chemical technician are closely related to chemistry. Other physical science and environmental science occupations are also related to chemistry.

Sources of Additional Information

General information on career opportunities and earnings for chemists is available from:

American Chemical Society, 1155 16th St. NW., Washington, D.C. 20036.

Chemical Manufacturers Association, 1825 Connecticut Ave. NW., Washington D.C. 20009.

Information on Federal job opportunities is available from State employment service offices or from U.S. Office of Personnel Management area offices or Federal Job Information Centers located in various large cities throughout the country.

Chiropractors

(D.O.T. 079.101-010)

Nature of the Work

Chiropractic is a system of treatment based on the principle that a person's health is determined largely by the nervous system, and that interference with this system impairs normal functions and lowers resistance to disease. Chiropractors treat patients primarily by manual manipulation (adjustments) of parts of the body, especially the spinal column.

Because of the emphasis on the spine and its position, most chiropractors use X-rays to aid in locating the source of patients' difficulties. In addition to manipulation, most chiropractors use supplementary measures such as water, light, ultrasound, electric, and heat therapy. They also prescribe diet, supports, exercise, and rest. Most State laws specify the types of supplementary treatment permitted in chiropractic. Chiropractors do not use prescription drugs or surgery.

Working Conditions

Chiropractors generally work in private offices. Their workweek typically is 4 1/2 to 5 days.

Places of Employment

About 18,000 persons practiced chiropractic in 1978. Most chiropractors were in private practice. Some were salaried assistants of established practitioners or worked for chiropractic clinics. Others taught or conducted research at chiropractic colleges.

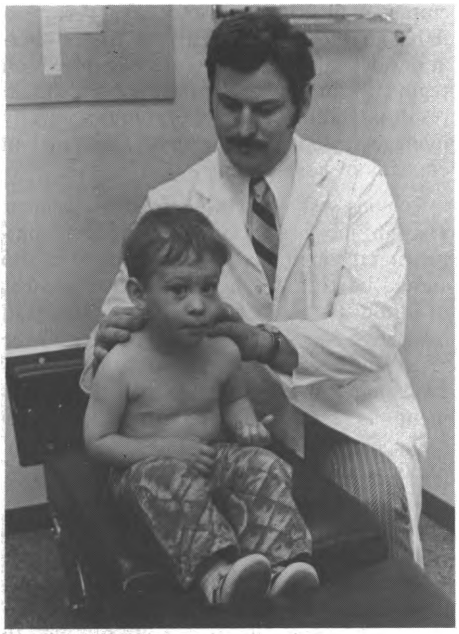
Chiropractors often locate in small communities—about half of work in cities of 50,000 inhabitants or less.

Training, Other Qualifications, and Advancement

All 50 States and the District of Columbia regulate the practice of chiropractic and grant licenses to chiropractors who meet certain educational requirements and pass a State board examination. Many States have reciprocity agreements that permit chiropractors licensed in one State to obtain a license in others without taking an examination.

Although the type of practice permitted and the educational requirements for a license vary considerably from one State to another, most States require successful completion of a 4-year chiropractic course following 2 years of preprofessional college work. Some States require that specific subjects such as English, chemistry, biology, or physics be a part of this preprofessional work. In addition, several States require that chiropractors pass a basic science examination.

In 1978, 6 of the 15 chiropractic colleges in the United States were fully accredited by the Council on Chiropractic Education; 3 others were recognized candidates working toward accreditation. All required applicants to have a minimum of 2 years of college before entrance, and most required that courses in English, the social sciences, chemistry, biology, and mathematics be taken during those 2 years. Chiropractic colleges emphasize courses in manipulation and spinal adjustments. Most offer a broader curriculum however, including subjects such as physiotherapy and nutrition. In most chiropractic colleges, the first 2 years of the curriculum chiefly include classroom and laboratory work in subjects such as anatomy, physiology, and biochem-



Chiropractic requires keen powers of observation in order to detect physical abnormalities.

istry. During the last 2 years, students obtain practical experience in college clinics. The degree of Doctor of Chiropractic (D.C.) is awarded to students completing 4 years of chiropractic training.

Chiropractic requires a keen sense of observation to detect physical abnormalities and considerable hand dexterity but not unusual strength or endurance. Persons desiring to become chiropractors should be able to work independently and handle responsibility. The ability to work with detail is important. Sympathy and understanding are desirable qualities for dealing effectively with patients.

Most newly licensed chiropractors either set up a new practice or purchase an established one. A moderate financial investment is usually necessary to open and equip an office. Some start as salaried chiropractors to acquire experience and funds needed.

Employment Outlook

Requirements for chiropractors are expected to grow about as fast as the average for all occupations through the 1980's. Enrollments in chiropractic colleges, however, have grown dramatically, partly in response to apparent broader public acceptance of the profession. As more students graduate, new chiropractors may find it increasingly difficult to establish a practice in those areas where other practitioners already are located. The best opportunities for new chiropractors may be in small towns and in areas with comparatively few established practitioners.

Earnings

In chiropractic, as in other types of independent practice, earnings are relatively low in the beginning. New graduates who worked as associates to established practitioners earned about $12,000 a year in 1978. Experienced chiropractors averaged about $25,000, according to limited data available, although many earned more.

Related Occupations

Chiropractors diagnose, treat and work to prevent diseases, disorders, and injuries. They emphasize the importance of the nervous system for good health. Other occupations that require similar skills include audiologists, dentists, optometrists, osteopaths, podiatrists, speech pathologists, and veterinarians.

Sources of Additional Information

The State board of licensing in the capital of each State can supply information on State licensing requirements for chiropractors.

General information on chiropractic as a career is available from:

American Chiropractic Association, 2200 Grand Ave., Des Moines, Iowa 50312.

International Chiropractors Association, 1901 L St. NW., Suite 800, Washington, D.C. 20036.

For a list of chiropractic colleges, as well as general information on chiropractic as a career, contact:

Council on Chiropractic Education, 3209 Ingersoll Street, Suite 206, Des Moines, Iowa 50312.

For information on requirements for admission to a specific chiropractic college, contact the admissions office of that school.

City Managers

(D.O.T. 188.117-114)

Nature of the Work

Population growth and industrial expansion place increasing pressure on housing, transportation, and other facilities of cities. Problems associated with the growth of modern communities, such as air and water pollution and rising crime rates, also demand attention. To cope effectively with these problems, many communities hire a specialist in management techniques—the city manager.

A city manager usually is appointed by the community's elected officials and is responsible directly to them. Although duties vary by city size, city managers generally administer and coordinate the day-to-day operations of the city. They are responsible for functions such as tax collection and disbursement, law enforcement, and public works. They also hire department heads and their staffs and prepare the annual budget to be approved by elected officials. In addition, they study current problems, such as traffic congestion, crime, or urban renewal, and report their findings to the elected council.

City managers must plan for future growth and development of cities and surrounding areas. To provide for an expansion of public services, they frequently appear at civic meetings to advocate certain programs or to inform citizens of current government operations.

City managers work closely with planning departments to coordinate new and existing programs. In smaller cities that have no permanent planning staff, coordination may be done entirely by the manager.

To aid the city manager, many cities employ *management assistants*: assistant city managers, department head assistants, (D.O.T. 189.167-030), administrative assistants (D.O.T. 169.167-010), and management analysts (D.O.T. 161.167-010). Under the manager's direction, management assistants administer programs, prepare reports, receive visitors, answer correspondence, and generally help to keep the city government functioning smoothly. Assistant city managers organize and coordinate city programs, supervise city employees, and act for the city manager on occasion. They also may assume responsibility for some projects, such as the development of a preliminary annual budget. Department head assistants generally are responsible for one activity, such as personnel, finance, or law enforcement, but they also may assist in other areas. Administrative assistants, also called executive assistants or assistants to the city manager, usually do administrative and staff work in all departments under the city manager. For instance, they may compile operating statistics or review and analyze work procedures. Management analysts study and recommend possible changes in organization or administrative procedures.

Working Conditions

City managers generally work in well lighted and ventilated offices. They often work overtime at night and on weekends meeting citizens' groups, attending civic functions, reading and writing reports, or finishing paperwork. When a problem arises or a crisis occurs, they may be called to work at any hour.

Places of Employment

About 3,000 city managers were employed in 1978. In addition, several times as many persons worked as administrative assistants, department head assistants, and assistant city managers. Most city managers worked for cities and counties that had a council-manager form of government. Under this type of government, an elected council appoints a manager who is responsible for the day-to-day operation of the government as well as for the hiring and firing of assistants, department heads, and other staff. Many other city managers worked for municipalities that had the mayor-council form of government, in which the mayor appoints the city manager as his or her chief administrative officer. A few city managers also worked for county governments, metropolitan or regional planning organizations, and councils of governments. All types of local govern-

City manager and management assistant prepare to brief the city council on the proposed city budget.

ments employed management assistants, but larger jurisdictions generally employed them in greater numbers.

Although over three-fourths of all city managers work for small cities having fewer than 25,000 inhabitants, many larger cities also employ a city manager. About one-half of the cities having a population of between 10,000 and 500,000 have city managers.

Training, Other Qualifications, and Advancement

A master's degree, preferably in public or business administration, is becoming essential for those seeking a career in city management. Although some applicants with only a bachelor's degree may find employment, strong competition for positions, even among master's degree recipients, will make the graduate degree a requirement for most entry level jobs. In some cases, employers may hire a person with a graduate degree in a field related to public administration, such as engineering, social work, political science or law.

In 1978, over 200 colleges and universities offered graduate degrees in public affairs or administration. Degree requirements in some schools include completion of an internship program in a city manager's office. During this internship period, which may last from 6 months to a year, the degree candidate observes local government operations and does research under the direct supervision of the city manager.

Nearly all city managers begin as management assistants. Most new graduates work as management analysts or administrative assistants to city managers for several years to gain experience in solving urban problems, coordinating public services, and applying management techniques. Others work in a government department such as finance, public works, or public planning. They may acquire supervisory skills and additional experience by working as assistant city manager or department head assistant. City managers often are first employed in small cities, but during their careers they may work in several cities of increasing size.

Persons who plan a career in city management should like to work with detail and to be a part of a team. They must have sound judgment, self-confidence, and the ability to perform well under stress. To handle emergencies, city managers must quickly isolate problems, identify their causes, and provide a number of possible solutions. City managers should be tactful and able to communicate and work well with people.

City managers also must be dedicated to public service since they often put in long, hard hours in times of crisis.

Employment Outlook

Employment of city managers and local government management assistants is expected to expand faster than the average for all occupations through the 1980's as management of our governments becomes more complex. Examples of more sophisticated management techniques include computerized tax and utility billing, electronic traffic control, and application of systems analysis to urban problems. The demand for city managers also will increase as more cities convert to the council-manager form of government, currently the fastest growing form of city government. Furthermore, city managers and management assistants will be employed by other types of local government to help elected officials with day-to-day operations of government. Increased emphasis on regional solutions to urban problems should result in additional job opportunities for city managers and management assistants in councils of government.

Persons who seek beginning management assistant jobs are expected to face keen competition through the 1980's. Competition also should be keen among the growing number of administrative assistants, department head assistants, and assistant city managers for the relatively few city manager positions. However, many of those unable to find employment as management assistants or city managers should find jobs in other fields of public administration.

Earnings

Salaries of city managers and management assistants vary according to experience, job responsibility, and city size. In 1978, the average annual salary for all managers was more than $26,000, about two and one- half times the average earnings for all nonsupervisory workers in private industry, except farming. In 1978, average annual salaries of city managers ranged from about $22,000 in small cities of 5,000 to 10,000 inhabitants to about $40,000 in medium-sized cities of 50,000 to 100,000 inhabitants, according to the International City Management Association. City managers employed in large cities earned salaries of more than $50,000 a year. City managers in cities not having council-manager governments received slightly less.

Salaries of management assistants ranged from about $12,000 in small cities to more than $20,000 in large ones. Salaries of assistant city managers generally were higher than those of other management assistants.

City managers often work more than 40 hours a week. Emergencies may require evening and weekend work and meetings with individuals and citizen's groups consume additional time.

Related Occupations

A variety of related careers are open to persons interested in managerial work. In the private sector, a wide range of managerial and executive carrers are possible in business and industry. In the public sector, related managerial occupations include: Program analysts, government program managers, management analysts, budget officers, school or hospital administrators, and airport managers.

Sources of Additional Information

For information on a career in city management, contact:

International City Management Association, 1140 Connecticut Ave. NW., Washington, D.C. 20036.

Claim Representatives

(D.O.T. 168.267-014, 241.217-010, .267-018, and 249.262-010)

Nature of the Work

Fast and fair settlement of all claims is essential to any insurance company if it is to meet its commitments to policyholders and also protect its own financial well-being. The people who investigate claims, negotiate settlement with policyholders, and authorize payment are known as claim representatives—a group that includes claim adjusters and claim examiners.

When a property-liability (casualty) insurance company receives a claim, the *claim adjuster* determines whether the policy covers it and the amount of the loss. Adjusters use reports, physical evidence, and testimony of witnesses in investigating a claim. When their company is liable, they negotiate with the claimant and settle the case.

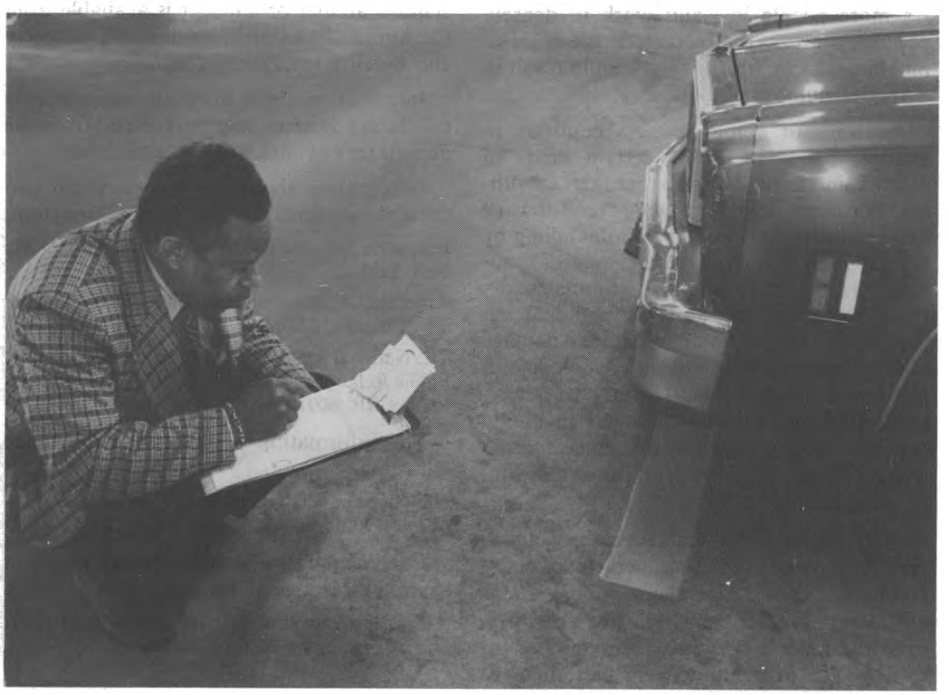
Adjusters must make sure that settlements reflect the claimant's actual losses. They must protect their company from false or inflated claims but, at the same time, settle valid claims fairly and promptly. Some adjusters are allowed to issue checks on company funds; most, however, submit their findings to claim examiners who review them to insure that proper procedures have been followed and then authorize payment.

Some adjusters work with all lines of insurance. Others specialize in claims from fire damage, marine loss, automobile damage, workers' compensation loss, or product liability. Several States have "no-fault" automobile insurance plans that relieve the adjuster from determining responsibility for a loss. Adjusters in these States still must decide the amount of loss, however. A growing number of casualty companies employ special adjusters to settle small claims, usually minor automobile or homeowner damage claims. These workers, generally called "inside adjusters" or "telephone adjusters," contact claimants by telephone or mail and have the policyholder send repair costs, medical bills, and other statements to the company. Many companies centralize this operation in a drive-in claims center where the cost of repair is determined and a check is issued on the spot.

Adjusters work away from the office most of the time. They may be called to the site of an accident, fire, or burglary. Adjusters make their own schedules of the activities needed to dispose of a claim properly. They also keep written or taped records of information obtained from witnesses and other sources and prepare reports of their findings.

In life insurance companies, the counterpart of the claim adjuster is the *claim examiner*, who investigates questionable claims or those exceeding a specified amount. They may check claim applications for completeness and accuracy, interview medical specialists, consult policy files to verify information on a claim, or calculate benefit payments. Generally, examiners are authorized to investigate and approve payment on all claims up to a certain limit; larger claims are referred to a senior examiner.

Examiners checking incorrect or questionable claims may correspond with investigating companies, field managers, agents, or the family of the insured. Claim examiners occasionally travel to obtain information by personal interview, or contact State insurance departments and other insurance companies. In addition to verifying claims and approving payment, examiners also maintain records of settled claims and prepare reports to be submitted to their company's data processing department. Some experienced examiners serve on committees, conduct surveys of claim practices within their company, and help devise more efficient ways to process claims. They, like claim adjusters, sometimes testify in court on contested claims.



Recording the details of damage assists agents in accurately estimating repair costs.

Working Conditions

Claim adjusting is not a desk job. It requires that a person be physically fit because much of the day may be spent in traveling, walking about outdoors, and climbing stairs. Adjusters may have to work evenings or weekends in order to interview witnesses and claimants. Since most companies provide 24-hour claim service to their policyholders, some adjusters always must be on call. (See the statement on the insurance industry for additional information on working conditions and employee benefits.) Occasionally, an experienced adjuster may travel to the scene of a disaster, such as a hurricane or a riot, to work with local personnel. Some cases may require travel outside the United States.

Claim examiners have desk jobs that require no unusual physical activity. Although the average workweek for examiners is 35 to 40 hours, they may work longer at times of peak claim loads or when quarterly and annual statements are prepared. They also may need to travel occasionally.

Places of Employment

About 169,000 persons worked as claim representatives in 1978. The majority of claim adjusters worked for insurance companies that sell property and liability coverage. Some were employed by independent adjusting firms that contract their services for a fee. These independent firms ranged from national companies employing hundreds of adjusting specialists to small 3- or 4-person local operations. A relatively small number of adjusters represent the insured rather than the insurance company. These "public adjusters" usually are retained by banks, financial organizations, and other business firms to handle fire and other losses to property. They negotiate claims against insurance companies and deal with adjusters for such companies.

Most claim examiners worked for life insurance companies in large cities, such as New York, San Francisco, Chicago, Dallas, and Philadelphia, where most home offices are located.

Training, Other Qualifications, and Advancement

Although a growing number of insurance companies prefer claim representatives to have a college degree, many hire those without college training, particularly if they have specialized experience. For example, persons experienced in automobile

repair may qualify as auto adjusters, and those with clerical experience might be hired as inside adjusters.

No specific field of college study is recommended. Although courses in insurance, economics, or other business subjects are helpful, a major in almost any college field is adequate preparation. An adjuster who has a business or accounting background might specialize in financial loss from business interruption or damage to merchandise. College training in engineering is helpful in adjusting industrial claims. A legal background is most helpful to those handling workers' compensation and product liability cases.

Most large insurance companies provide beginning claim adjusters and examiners on-the-job training and home study courses. Claim representatives are encouraged to take courses designed to enhance their professional skills. For example, the Insurance Institute of America offers a six-semester study program leading to an associate degree in claims adjusting upon successful completion of six examinations. Adjusters can prepare for these examinations by independent home study or through company or public classes. A professional Certificate in Insurance Adjusting also is available from the College of Insurance in New York City.

The Life Office Management Association (LOMA), in cooperation with the International Claim Association, offers a claims education program for life and health examiners. The program is part of the LOMA Institute Insurance Education Program leading to the professional designation, FLMI (Fellow, Life Management Institute) upon successful completion of eight written examinations.

About three-fourths of the States require adjusters to be licensed. Despite wide variation in State licensing requirements, applicants usually must comply with one or more of the following: Pass a written examination covering the fundamentals of adjusting; furnish character references; be 20 or 21 years of age and a resident of the State; offer proof that they have completed an approved course in insurance or loss adjusting; and file a surety bond.

Because they often work closely with claimants, witnesses, and other insurance professionals, representatives must be able to adapt to many different persons and situations. They should be able to communicate effectively and gain the respect and cooperation of people from different backgrounds. For example, when adjusters' evaluations of claims differ from those of the persons who have suffered the loss, they should be able to explain their conclusions tactfully. Examiners need to be familiar with medical and legal terms and practices and Federal and State insurance laws and regulations. Because they may have to check premium payments, policy values, and other numerical items in processing a claim, examiners should be adept at making mathematical calculations. Both adjusters and examiners should have a good memory and enjoy working with details.

Beginning adjusters and examiners work on small claims under the supervision of an experienced worker. As they learn more about claim investigation and settlement, they are assigned claims that are higher in loss value and more difficult. Trainees are promoted as they demonstrate competence in handling assignments and as they progress in their course work. Because of the complexity of insurance regulations and claims procedures, workers who lack formal academic training may advance more slowly than those with 2 years or more of college. Employees who show unusual competence in claims work or outstanding administrative skills may be promoted to department supervisor in a field office or to a managerial position in the home office. Qualified adjusters and examiners sometimes transfer to other departments, such as underwriting or sales.

Employment Outlook

Employment of claim representatives is expected to grow faster than the average for all occupations through the 1980's as the number of insurance claims continues to increase. In addition to jobs created by growth in the need for these workers, many jobs will result from the need to replace workers who die, retire, or transfer to other jobs.

Several factors point to a growing volume of insurance and a resulting need for claim adjusters. Over the next decade a steadily rising number of workers will be entering their most productive years. These workers and their families are likely to seek insurance protection as they purchase homes, automobiles, and other consumer durables. New or expanding businesses will need protection for new plants and equipment and for insurance covering their employees' health and safety. As more people live and work in densely populated areas, the increased risk of automobile accident, fire, or theft should result in a greater number of claims.

As ways of doing business continue to change, the demand for certain kinds of claim adjusters will be stronger than for others. For example, the growing trend toward drive-in claim centers and claim handling by telephone should reduce the demand for automobile adjusters while it stimulates demand for inside adjusters. Independent adjusters who specialize in automobile damage claims should continue to suffer some loss of business. Prospects should be excellent, however, for adjusters who specialize in highly complex types of business insurance such as marine cargo, workers' compensation, and product liability.

A similar situation exists for claim examiners. Employment of examiners in casualty companies should rise about as fast as for adjusters; however, much slower growth is expected for life insurance examiners as increased use of computers enables them to process more claims, especially routine ones and those that arise under group policies.

Earnings

According to a survey of property and liability companies, claim adjusters averaged about $14,760 a year in 1978; inside adjusters earned average salaries of about $11,215. Most public adjusters are paid a percentage of the amount of the settlement—generally 10 percent. Adjusters are furnished a company car or are reimbursed for use of their own vehicles for business purposes. Salaries of claim adjusters are about one and one-half times the average earnings for all nonsupervisory workers in private industry, except farming; salaries of inside adjusters are slightly above the average for all nonsupervisory workers.

A survey of life insurance companies by the Life Office Management Association revealed that claim examiners earned average salaries of $13,870 a year in 1978. According to the survey of property and liability companies, casualty claim examiners averaged $17,100. Claim supervisors in casualty companies and life companies averaged $18,650 a year. Claim examiners earn more than one and one-half times the average for all nonsupervisory workers in private industry, except farming.

Most insurance companies have liberal vacation policies and other employee benefits.

Related Occupations

Other workers who have to make critical decisions on the basis of financial data include auditors, loan officers, credit managers, and real estate appraisers.

Sources of Additional Information

General information about a career as a claim examiner or adjuster is available from the home offices of many life and property and liability insurance companies.

Information about licensing requirements for claim adjusters may be obtained from the department of insurance in each State.

Information about career opportunities in these occupations also may be obtained from:

Insurance Information Institute, 110 William St., New York, N.Y. 10038.

American Alliance of Insurance, 20 N. Wacker Dr., Chicago, Ill. 60606.

The National Association of Independent Insurers, Public Relations Department, 2600 River Rd., Des Plaines, Ill. 60018.

For information about public insurance adjusting, contact:

National Association of Public Adjusters, 1613 Munsey Building, Baltimore, Md. 21202.

Career information on life insurance claim examining is available from:

American Council of Life Insurance, 1850 K St. NW., Washington, D.C. 20006.

Clergy

Deciding on a career in the clergy involves considerations different from those involved in other career choices. When persons choose to enter the ministry, priesthood, or rabbinate, they do so primarily because they possess a strong religious faith and a desire to help others. Nevertheless, it is important to know as much as possible about the profession and how to prepare for it, the kind of life it offers, and its needs for personnel.

The number of clergy needed depends largely on the number of people who participate in organized religious groups. This affects the number of churches and synagogues established and pulpits to be filled. In addition to the clergy who serve congregations, many others teach or act as administrators in seminaries and in other educational institutions; still others serve as chaplains in the Armed Forces, industry, correctional institutions, hospitals, or on college campuses; or render service as missionaries or in social welfare agencies.

Persons considering a career in the clergy should seek the counsel of a religious leader of their faith to aid in evaluating their qualifications. The most important of these are a deep religious belief and a desire to serve the spiritual needs of others. The priest, minister, or rabbi also is expected to be a model of moral and ethical conduct. A person considering one of these fields must realize that the civic, social, and recreational activities of a member of the clergy often are influenced and restricted by the customs and attitudes of the community.

The clergy should be sensitive to the needs of others and able to help them deal with these needs. The job demands an ability to speak and write effectively, to organize, and to supervise others. The person entering this field also must enjoy studying because the ministry is an occupation which requires continuous learning. In addition, the ministry demands considerable initiative and self-discipline.

More detailed information on the clergy in the three largest faiths in the United States—Protestant, Roman Catholic, and Jewish—is given in the following statements, prepared in cooperation with leaders of these faiths. Information on the clergy in other faiths may be obtained directly from leaders of the respective groups.

Minister conducting worship services.

Protestant Ministers

(D.O.T. 120.007-010)

Nature of the Work

Protestant ministers lead their congregations in worship services and administer the various rites in their churches, such as baptism, confirmation, and Holy Communion. They prepare and deliver sermons and give religious instruction. They also perform marriages; conduct funerals; counsel individuals who seek guidance; visit the sick, aged, and handicapped at home and in the hospital; comfort the bereaved; and serve church members in other ways. Many Protestant ministers write articles for publication, give speeches, and engage in interfaith, community, civic, educational, and recreational activities sponsored by or related to the interests of the church. Some ministers teach in seminaries, colleges, and universities.

The services that ministers conduct differ among Protestant denominations and also among congregations within a denomination. In many denominations, ministers follow a traditional order of worship; in others, they adapt the services to the needs of youth and other groups within the congregation. Most services include Bible reading, hymn singing, prayers, and a sermon. In some denominations, Bible reading by a member of the congregation and individual testimonials may constitute a large part of the service.

Ministers serving small congregations generally work on a personal basis with their parishioners. Those serving large congregations have greater administrative responsibilities and spend considerable time working with committees, church officers, and staff, besides performing their other duties. They may have one or more associates or assistants who share specific aspects of the ministry, such as a minister of education who assists in educational programs for different age groups, or a minister of music.

Working Conditions

Ministers are "on call" for any serious troubles or emergencies that involve or affect members of their churches. They also may work long and irregular hours in administrative, educational, and community service activities.

Many of the ministers' duties are sedentary in nature, such as reading or researching in a study or a library while preparing sermons or writing articles.

In denominations such as the Methodist Church, ministers are subject to reassignment by a central body to a new pastorate every few years.

Places of Employment

In 1978, most of the 190,000 Protestant ministers served individual congregations. Some also worked in closely related fields such as chaplains in hospitals and the Armed Forces. The greatest number of clergy are affiliated with the five largest groups of churches—Baptist, United Methodist, Lutheran, Presbyterian, and Episcopal.

All cities and most towns in the United States have at least one Protestant church with a full-time minister. Some churches employ part-time ministers; many part-time clergy are seminary students, ministers retired from full-time pastoral responsibilities, or those who also have secular jobs. Although most ministers are located in urban areas, many live in less densely populated areas where they may serve two or more congregations.

Training and Other Qualifications

Educational requirements for entry into the Protestant ministry vary greatly. Some denominations have no formal educational requirements, and others ordain persons having varying amounts and types of training in Bible colleges, Bible institutes, or liberal arts colleges.

In 1978, there were 146 American theological institutes accredited by the Association of Theological Schools in the United States and Canada. These admit only students who have received a bachelor's degree or its equivalent with a liberal arts major from an accredited college. Many denominations require a 3-year course of professional study in one of these accredited schools or seminaries after college graduation. The degree of master of divinity is awarded upon completion.

Recommended preseminary or undergraduate college courses include English, history, philosophy, the natural sciences, social sciences, the fine arts, music, religion, and foreign languages. These courses provide a knowledge of modern social, cultural, and scientific institutions and problems. However, students considering theological study should contact, at the earliest possible date, the schools to which they intend to apply, to learn how to prepare for the program they expect to enter.

The standard curriculum for accredited theological schools consists of four major categories: Biblical, historical, theological, and practical. Courses of a practical nature such as psychology, religious education, and administration are emphasized. Many accredited schools require that students gain experience in church work under the supervision of a faculty member or experienced minister. Some institutions offer doctor of ministry degrees to students who have completed 1 year or more of additional study after serving at least a year as minister. Scholarships and loans are available for students of theological institutions.

In general, each large denomination has its own school or schools of theology that reflect its particular doctrine, interests, and needs. However, many of these schools are open to students from other denominations. Several interdenominational schools associated with universities give both undergraduate and graduate training covering a wide range of theological points of view.

Persons who have denominational qualifications for the ministry usually are ordained after graduation from a seminary. In denominations that do not require seminary training, clergy are ordained at various appointed times. For example, the Evangelical minister may be ordained with only a high school education.

Men and women entering the clergy often begin their careers as pastors of small congregations or as assistant pastors in large churches.

Employment Outlook

The anticipated slow growth in church membership combined with pressures of rising costs and inadequate financial support are expected to result in only limited growth in requirements for ministers. However, the number of persons being ordained has been increasing and is likely to continue to do so. As a result, new graduates of theological schools are expected to face increasing competition in finding positions and more experienced ministers will face competition in their efforts to move to large congregations with greater responsibility and more remuneration. The supply-demand situation will vary among denominations, with more favorable prospects for ministers in Evangelical churches. Most of the openings for clergy that are expected through the 1980's will therefore result from the need to replace those in existing positions who retire, die, or leave the ministry.

Newly ordained Protestant ministers who do not have a parish have these alternatives: Working in youth counseling, family relations, and welfare organizations; teaching in religious educational institutions; and serving as chaplains in the Armed Forces, hospitals, universities, and correctional institutions.

Earnings and Working Conditions

Salaries of Protestant clergy vary substantially, depending on age, experience, denomination, size and wealth of congregation, and geographic location. The estimated median annual income of Protestant ministers, including housing allowance, was about $13,000 in 1978.

Sources of Additional Information

Persons who are interested in entering the Protestant ministry should seek the counsel of a minister or church guidance worker. Each theological school can supply information on admission requirements. Prospective ministers also should contact the ordination supervision body of their particular denomination for information on special requirements for ordination.

Rabbis

(D.O.T. 120.007-010)

Nature of the Work

Rabbis are the spiritual leaders of their congregations and teachers and interpreters of Jewish law and tradition. They conduct religious services and deliver sermons on the Sabbath and on Jewish holidays. Like other clergy, rabbis conduct weddings and funeral services, visit the sick, help the poor, comfort the bereaved, supervise religious education programs, engage in interfaith activities, and involve themselves in community affairs.

Rabbis serving large congregations may spend considerable time in administrative duties, working with their staffs and committees. Large congregations frequently have an associate or assistant rabbi. Many assistant rabbis serve as educational directors.

Nearly all rabbis serve Orthodox, Conservative, or Reform congregations. Regardless of their particular point of view, all Jewish congregations preserve the substance of Jewish religious worship. Congregations differ in the extent to which they follow the traditional form of worship—for example, in the wearing of head coverings, the use of Hebrew as the language of prayer, or the use of music or a choir. The format of the worship service and, therefore, the ritual that the rabbis use may vary even among congregations belonging to the same branch of Judaism.

Rabbis also may write for religious and lay publications, and teach in theological seminaries, colleges, and universities.

Working Conditions

Rabbis work long hours and are "on call" to visit the sick, comfort the bereaved, and provide counseling to those who need it. Community and educational activities may also require long or irregular hours.

Some of their duties are intellectual and sedentary, such as study of religious texts and researching and writing sermons and articles for publication.

Rabbis have a good deal of independent authority, since there is no formal hierarchy among them. They are responsible only to the Board of Trustees of the congregations they serve.

Rabbi telling Bible stories to nursery school children in his congregation.

Places of Employment

About 4,000 persons were employed as rabbis in 1978; approximately 1,550 were Orthodox rabbis, 1,350 were Conservative, and 1,200 Reform. Some work as chaplains in the military services, in hospitals and other institutions, or in one of the many Jewish community service agencies. Others are employed in colleges and universities as teachers in Jewish Studies programs.

Although rabbis serve Jewish communities throughout the Nation, they are concentrated in those States that have large Jewish populations, particularly New York, California, Pennsylvania, New Jersey, Florida, Illinois, Massachusetts, Maryland including the Washington, D.C. metropolitan area, and Ohio.

Training and Other Qualifications

To become eligible for ordination as a rabbi, a student must complete a course of study in a seminary. Entrance requirements and the curriculum depend upon the branch of Judaism with which the seminary is associated.

About 30 seminaries train Orthodox rabbis. The Rabbi Isaac Elchanan Theological Seminary and the Hebrew Teachers College of Skokie are the two seminaries in the United States that have formal 3-year ordination programs and require a bachelor's degree for entry. Most Orthodox rabbis, however, are ordained informally in seminaries with programs of varying length, depending on the individual student. There are no formal requirements for admission to these seminaries, nor are any degrees granted. When students have become sufficiently learned in the Talmud, the Bible, and other religious studies, they may be ordained with approval of three authorized rabbis.

The Hebrew Union College—Jewish Institute of Religion is the official seminary that trains rabbis for the Reform branch of Judaism. It is the only major branch that has approved the training and ordination of women as rabbis. In 1978, about 20 percent of the 200 Reform seminarians were women.

The Jewish Theological Seminary of America is the official seminary that trains rabbis for the Conservative branch of Judaism. Both seminaries require the completion of a 4-year college course, as well as earlier preparation in Jewish studies, for admission to the rabbinic program leading to ordination. Normally 5 years of study are required to complete the rabbinic course at the Reform seminary, including 1 year of preparatory study in Jerusalem. Exceptionally well-prepared students can shorten this 5-year period to a minimum of 3 years. A student having a strong background in Jewish studies can complete the course at the Conservative seminary in 4 years; for other enrollees, the course may take as long as 6 years.

In general, the curriculums of Jewish theological seminaries provide students with a comprehensive knowledge of the Bible, Talmud, Rabbinic literature, Jewish history, theology, and courses in education, pastoral psychology, and public speaking. Students of the Reform seminary get extensive practical training in dealing with the social and political problems in the community. Training for alternatives to the pulpit, such as leadership in community services and religious education, increasingly is stressed.

Some seminaries grant advanced academic degrees in fields such as Biblical and Talmudic research. All Jewish theological seminaries make scholarships and loans available. Newly ordained rabbis usually begin as leaders of small congregations, assistants to experienced rabbis, directors of Hillel Foundations on college campuses, teachers in seminaries and other educational institutions, or chaplains in the Armed Forces. As a rule, the pulpits of large and well-established Jewish congregations are filled by experienced rabbis.

Employment Outlook

The employment outlook for rabbis varies among the three major branches of Judaism.

Reform rabbis may face competition for available positions. As a result, the Hebrew Union College—Jewish Institute of Religion, the only seminary that trains rabbis for the Reform branch of Judaism, has begun to limit enrollments by raising admission standards.

Orthodox clergy already encounter keen competition, attributable in large part to the informal ordination process. More Orthodox rabbis have been involved in teaching in religious schools at various levels than in pulpit work, and this is expected to continue. Many will also have to seek employment in secular fields.

Rabbis in the Conservative branch of Judaism, on the other hand, will have very good employment opportunities, if present trends continue.

Earnings

Incomes vary depending on the size and financial status of the congregation, as well as its denominational branch and geographic location. Rabbis usually earn additional income from gifts or fees for officiating at ceremonies such as weddings.

In 1978, the annual earnings of rabbis generally ranged from $15,000 to $35,000, including housing allowance. Earnings of Orthodox rabbis tend to be at the lower end of the scale; earnings of Conservative and Reform rabbis tend to be at the upper end of the scale. Some senior rabbis in large congregations earn upward of $50,000 a year.

Sources of Additional Information

Persons who are interested in becoming rabbis should discuss their plans for a vocation with a practicing rabbi. Information on the work of rabbis and allied occupations can be obtained from:

The Jewish Theological Seminary of America, (Conservative), 3080 Broadway, New York, N.Y. 10027.

The Rabbi Issac Elchanan Theological Seminary, an affiliate of Yeshiva University, (Orthodox), 2540 Amsterdam Ave., New York, N.Y. 10033.

Hebrew Union College—Jewish Institute of Religion, (Reform), whose three campuses are located at 1 W. 4th St., New York, N.Y. 10012; at 3101 Clifton Ave., Cincinnati, Ohio 45220; and at 3077 University Mall, Los Angeles, Calif. 90007; Reconstructionist Rabbinical College, 2308 N. Broad St., Philadelphia, Pa. 19132.

Roman Catholic Priests

(D.O.T. 120.007-010)

Nature of the Work

Roman Catholic priests attend to the spiritual, pastoral, moral, and educational needs of the members of their church. Their duties involve delivering sermons; administering the sacraments of marriage and of penance, and presiding at liturgical functions, such as funeral services. They also comfort the sick, console and counsel those in need of guidance, and assist the poor.

Their day usually begins with morning meditation and Mass, and may end with the hearing of confessions or an evening visit to a hospital or a home. Many priests direct and serve on church committees, work in civic and charitable organizations, and assist in community projects.

There are two main classifications of priests—diocesan (secular) and religious. Both types have the same powers acquired through ordination by a bishop. The differences lie in their way of life, the type of work to which they are assigned, and the church authority to whom they are immediately subject. Diocesan priests generally work as individuals in parishes assigned to them by the bishop of their diocese. Religious priests generally work as part of a religious order, such as the Jesuits, Dominicans, or Franciscans. They may engage in specialized activities, such as teaching or missionary work, assigned to them by superiors of their order.

Both religious and diocesan priests hold teaching and administrative posts in Catholic seminaries, colleges and universities, and high schools. Priests attached to religious orders staff a large proportion of the church's institutions of higher education and many high schools, whereas diocesan priests are usually concerned with the parochial schools attached to parish churches and with diocesan high schools. The members of religious orders do most of the missionary work conducted by the Catholic Church in this country and abroad.

Working Conditions

Priests spend long and irregular hours working for the church and the community.

Religious priests are assigned duties by their superiors in their particular orders. Some religious priests serve as missionaries in foreign countries where they may live under difficult and primitive conditions. Some religious priests live a communal life in monasteries where they devote themselves to prayer, study, and assigned work.

Diocesan priests ordinarily serve church members in parishes and they are "on call" at all hours to serve their parishioners in emergency situations. They also have many intellectual duties including study of the scriptures and keeping up with current religious and secular events in order to prepare sermons. Diocesan priests are responsible to the bishop in the diocese.

Roman Catholic Priests attend to spiritual needs of members of their church.

Places of Employment

There were approximately 58,000 priests in 1978. There are priests in nearly every city and town and in many rural communities. The majority are in metropolitan areas, where most Catholics reside. Catholics are concentrated in the Northeast and Great Lakes regions, with smaller concentrations in California, Texas, and Louisiana. Large numbers of priests are located in communities near Catholic educational and other institutions.

Training and Other Qualifications

Preparation for the priesthood generally requires 8 years of study beyond high school. There are over 450 seminaries where students receive training for the priesthood. Preparatory study may begin in the first year of high school, at the college level, or in theological seminaries after college graduation.

High school seminaries provide a college preparatory program that emphasizes English grammar, speech, literature, and social studies. Some study of Latin is required and the study of modern language is encouraged. The seminary college offers a liberal arts program, stressing philosophy and religion; the study of man through the behavioral sciences and history; and the natural sciences and mathematics. In many college seminaries, a

student may concentrate in any of these fields.

The remaining 4 years of preparation include sacred scripture; dogmatic, moral, and pastoral theology; homiletics (art of preaching); church history; liturgy (Mass); and canon law. Fieldwork experience usually is also required; in recent years, this aspect of a priest's training has been emphasized. Diocesan and religious priests attend different major seminaries, where slight variations in the training reflect the differences in the type of work expected of them as priests. Priests commit themselves not to marry.

Postgraduate work in theology is offered at a number of American Catholic universities or at ecclesiastical universities around the world, particularly in Rome. Also, many priests do graduate work in fields unrelated to theology. Priests are encouraged by the Catholic Church to continue their studies, at least informally, after ordination. In recent years, continuing education for ordained priests has stressed social sciences, such as sociology and psychology.

Young men never are denied entry into seminaries because of lack of funds. In seminaries for secular priests, scholarships or loans are available. Those in religious seminaries are financed by contributions of benefactors.

The first assignment of a newly ordained secular priest is usually that of assistant pastor or curate. Newly ordained priests of religious orders are assigned to the specialized duties for which they are trained. Depending on the talents, interests, and experience of the individual, many opportunities for greater responsibility exist within the church.

Employment Outlook

More priests will be needed in the years ahead to provide for the spiritual, educational, and social needs of the increasing number of Catholics. During the past decade, the number of ordained priests has been insufficient to fill the needs of newly established parishes and other Catholic institutions, and to replace priests who retire or die. This situation is likely to persist and perhaps worsen, if the sharp drop in seminary enrollment continues.

In response to the shortage of priests, certain functions within the church, traditionally performed by priests are now being performed by lay deacons, and this trend is expected to increase in the future. Priests will continue to offer Mass, administer the sacraments, and hear confession, but probably will be less involved in teaching, administrative, and community work. An increasing number of lay deacons are being ordained to preach and perform liturgical functions such as distributing holy communion and reading the gospel at the Mass.

Earnings

Diocesan priests' salaries vary from diocese to diocese and range from $2,000 to $6,000 a year. The diocesan priest also may receive a car allowance of $25 to $50 a month, free room and board in the parish rectory, and fringe benefits such as group insurance and retirement benefits in the diocese.

Religious priests take a vow of poverty and are supported by their religious order.

Priests who do special work related to the church, such as teaching, usually receive a partial salary which is less than a lay person in the same position would receive. The difference between the usual salary for these jobs and the salary that the priest receives is called "contributed service." In some of these situations, housing and related expenses may be provided; in other cases, the priest must make his own arrangements. Some priests doing special work may receive the same compensation that a lay person would receive.

Sources of Additional Information

Young men interested in entering the priesthood should seek the guidance and counsel of their parish priests. For information regarding the different religious orders and the secular priesthood, as well as a list of the seminaries which prepare students for the priesthood, contact the diocesan Directors of Vocations through the office of the local pastor or bishop.

College Student Personnel Workers

(D.O.T. 045.107-010, -018, -026, -038; 090.107 through .167 exc. 117-022; 129.107-018; 166.167-014)

Nature of the Work

A student's choice of a particular institution of higher education is influenced by many factors. Availability of a specific educational program, quality of the school, cost, and location all may play important roles.

For many students, however, an equally important factor is the institution's ability to provide for their housing, social, cultural, and recreational needs. Developing and administering these services are the tasks of college student personnel workers. The admissions officer, the registrar, the dean of students, and the career planning and placement counselor are probably the best known among these. Other workers who make up this broad occupational field include student activities and college union personnel, student housing officers, counselors in the college counseling center, financial aid officers, and foreign student advisers.

Titles of student personnel workers vary from institution to institution, from program to program within a single school, and with the level of responsibility within a student personnel program. The more common titles include dean, director, officer, associate dean, assistant director, and counselor.

The *dean of students*, or the vice president for student affairs, heads the student personnel program at a school. Among his or her duties are evaluating the changing needs of the students and helping the president of the college develop institutional policies. For example, to meet the needs of an increasing number of older, part-time students, colleges and universities have been changing their policies concerning areas such as student housing and student participation in decisions on graduation requirements and course offerings. In addition, the dean of students generally coordinates a staff of associate or assistant deans who are in charge of specific programs that deal directly with the students.

Admissions counselors interview and evaluate prospective students and process their applications. They may travel extensively to recruit high school, junior college, and older students and to acquaint them with opportunities available at their college. They work closely with faculty, administrators, financial aid personnel, and public relations staffs to determine policies for recruiting and admitting students.

Personnel in the office of the *registrar* maintain the academic records of students and provide current enrollment statistics to those who require them both within the college and in the community.

Student financial aid personnel help students obtain financial support for their education. Workers in this field must keep well informed about the sources and management of all forms of financial aid—scholarships, grants, loans, employment, fellowships, and teaching and research assistantships. They work closely with administrators and the admissions, counseling, business, and academic office staffs.

Career planning and placement counselors, sometimes called college placement officers, assist students in career selections and also may help them get part-time and summer jobs. On many campuses, they arrange for prospective employers to visit the school to discuss their personnel needs and to interview applicants. For further information on this field, see the chapter on college career planning and placement counselors.

The student personnel staff in charge of *student activities* work with members of proposed and established student organizations, especially with student government. They help the student groups to plan, implement, and evaluate their activities. Often, the student activities staff will assist in the orientation of new students.

College union staff members work with students to provide intellectual, cultural, and recreational programs. Many college union staff members direct the operation of the physical facilities and services of the college union building, such as food and recreational services, building maintenance, fiscal planning, and conference facilities.

Student housing officers sometimes live in

Financial aid personnel must be well informed about all sources of financial aid.

the dormitories and, in general, help the students to live together in harmony. They may serve as counselors to individual students with personal problems. Housing officers also may be involved in managing the fiscal, food service, and housekeeping operations of student residences.

Counselors help students with personal, educational, and vocational problems. Students may come to the counselors on their own or be referred by a faculty member, a residence hall counselor, or a friend. Counseling needs may arise from lack of self-confidence or motivation on the part of the student, failure in academic work, desire to leave college or transfer to another college, inability to get along with others, loneliness, drug abuse, or marriage problems. In addition, there is a growing trend for counselors to try to reach more students by establishing group sensitivity sessions and telephone "hotlines." Counselors often administer tests that indicate aptitudes and interests to students having trouble understanding themselves. Some also teach in the college or assist with admissions, orientation, and training of residence hall staff. For further information on this field, see the chapter on psychologists that appears elsewhere in the *Handbook*.

Foreign student advisers administer and coordinate many of the services that help to insure a successful academic and social experience for students from other countries. They usually assist with foreign student admissions, orientation, financial aid, housing, English as a foreign language, academic and personal counseling, student-community relationships, job placement, and alumni relations. In addition, they may work as an adviser for international associations and nationality groups and for U.S. students interested in study, educational travel, work, or service projects abroad.

Working Conditions

Students are not always available for consultation or meetings during the day, so evening and weekend work is common. And since the workflow at a college may be irregular, college student personnel workers sometimes face hectic periods where they work more than 40 hours a week. Registrars, for example, are especially busy during the weeks immediately preceding and including registration, while admissions counselors at private institutions may work long hours in early spring, as the deadline for determining next year's student body approaches.

Places of Employment

An estimated 55,000 college student personnel workers were employed in 1978. Every college and university, whether a 2-year or a 4-year school, has a staff performing student personnel functions. They are not always organized as a unified program. Large colleges and universities generally have specialized staffs for each personnel function. In many small colleges, a few persons may carry out the entire student personnel program.

Training, Other Qualifications, and Advancement

Because of the diversity in duties, the education and backgrounds of college student personnel workers vary considerably. Generally, however, a master's degree is preferred and a doctoral degree may be necessary for advancement to toplevel positions. Schools often prefer persons who have a bachelor's degree in a social science, such as economics or history, and a master's degree in student personnel work. In 1978, over 100 colleges and universities offered graduate programs in this area.

Other specialized training also may be required for some student personnel occupations. A master's degree in clinical or counseling psychology usually is required for work as a college counselor. This degree also is helpful in other student personnel fields such as career planning and placement. Familiarity with data processing is an asset, especially for work in admissions, records, or financial aid.

Previous experience in college administration is desirable. Many graduate students obtain this experience by working part time in residence halls or in financial aid or admissions offices, sometimes as part of a work/study program. Participation in student government as an undergraduate also provides useful exposure.

College student personnel workers must be interested in, and able to work with, people of all backgrounds and ages. They must have the patience to cope with conflicting viewpoints of students, faculty, and parents. People in this field often deal with the unexpected and the unusual; therefore, emotional stability and the ability to function while under pressure are necessities.

Entry level positions usually are those of student activities advisers, admissions counselors, financial aid counselors, residence hall directors, and assistants to deans. Persons who do not have graduate degrees may find advancement opportunities limited. A doctorate usually is necessary for the top student personnel positions.

Employment Outlook

The employment outlook for college student personnel workers is likely to be somewhat competitive through the 1980's. Tightening budgets in both public and private colleges and universities are expected to limit growth in employment. Student personnel positions least likely to be affected if some reduction becomes necessary are those in admissions and financial aid. Most openings will result from the need to replace personnel who transfer to other positions, retire, or leave the field for other reasons.

Any employment growth that does occur is expected to be in junior and community colleges. Enrollment at this level of education has been rising and many new schools have opened. If this trend continues, some additional student personnel workers will be needed in 2-year institutions.

Earnings

In 1978, annual salaries averaged $37,800 for presidents and chancellors, $28,100 for deans, $20,600 for counseling directors, $20,300 for admissions directors, $18,000 for registrars, $17,900 for placement directors, $16,800 for financial aid directors, and $16,700 for housing directors, according to a survey by the National Center for Education Statistics. Salaries vary greatly, however, depending on geographic location and the size of the school.

Employment in these occupations usually is on a 12-month basis. In many schools, college student personnel workers are entitled to retirement, group medical and life insurance, and sabbatical and other benefits.

Related Occupations

Secondary and elementary schools also need a variety of administrative workers to operate effectively. Included in this group are superintendents, principals, deans, guidance counselors, and school psychologists.

Cooperative Extension Service Workers

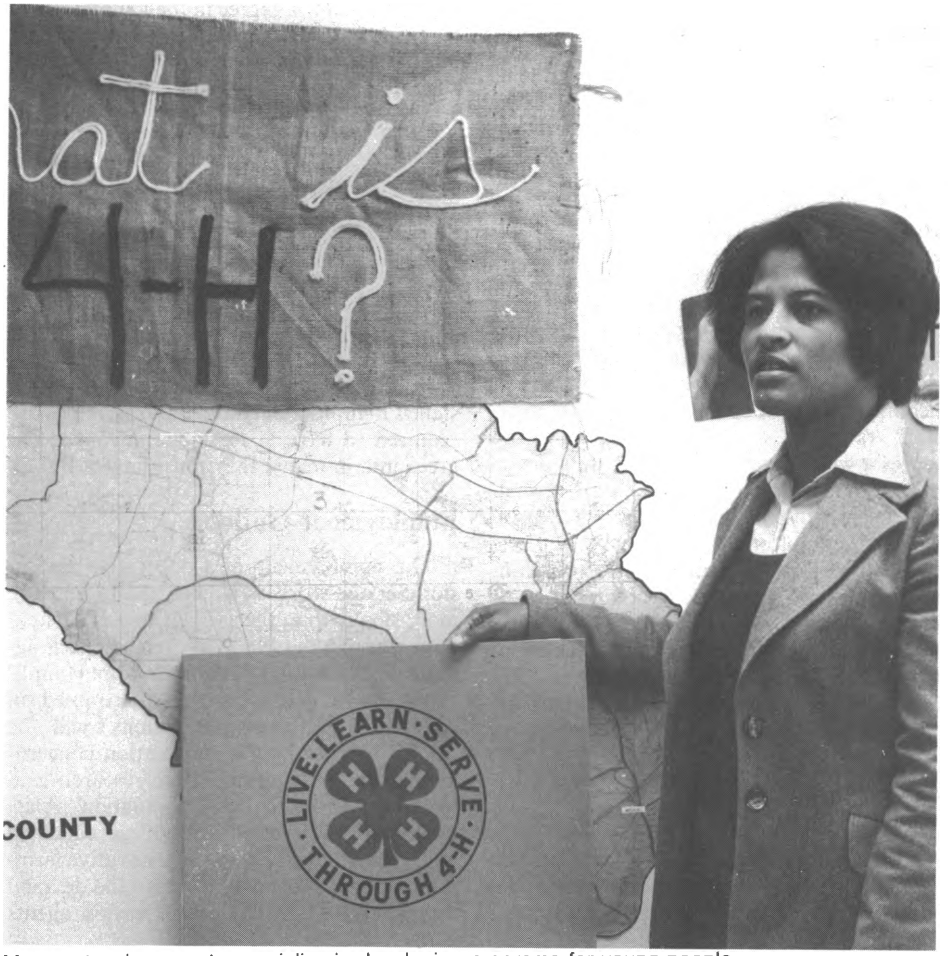
(D.O.T. 096.121, .127, .161, and .167)

Nature of the Work

Cooperative Extension Service workers, or extension agents as they are often called, conduct educational programs for rural residents in areas such as agriculture, home economics, youth activities, and community resource development. Extension agents generally specialize in one of these areas and have titles that match their specialties, such as extension agent for youth activities or extension agent for agriculture science and horticulture. They are employed jointly by State land-grant universities and the U.S. Department of Agriculture.

Extension agents usually work with groups of people. For example, the extension agent for youth activities leads meetings of local 4-H clubs, and during the summer, may plan and organize day camps to provide recreational activities for young people. Agents who work in home economics set up community meetings and programs on subjects of interest to homemakers. For example, they may discuss the benefits of good nutrition and offer advice on how to plan meals and buy and prepare food. Agriculture science extension agents conduct meetings on topics of special interest to area farmers. In a county which has much dairy farming, extension agents arrange seminars on subjects such as dairy herd health or the raising of forage crops. During these seminars, agents teach farmers how to selectthe proper feeds to meet cows' nutritional needs and raise their output of milk, and how to recognize and combat health hazards,including perhaps establishing a herd-inspection program. They also may help local farmers market their products.

Extension agents for community resource development meet with community leaders to plan and provide for economic development of the community. They also assist community leaders in developing recreational programs and facilities and in planning other public projects, such as water supply and sewage systems, libraries, and schools.



Many extension agents specialize in developing programs for young people.

In addition to group work, agents also do fieldwork with individuals. If a farmer is having a problem with crops, an extension agent will visit the farm, examine the problem, and suggest remedies. Likewise, home economics extension agents occasionally visit homemakers to give personal help in solving problems.

An important part of each extension worker's job is to provide information that is important to people in the community. Many extension agents write articles dealing with their areas of specialization for local newspapers. Often these are regular feature columns that appear once a week. Other agents appear on local radio and television shows to give marketing reports for agricultural products important to the area, or present Saturday morning programs for young people. A few extension service workers produce documentary films on topics in which they have special training for broadcast on local television stations. Also, extension workers at some land-grant universities produce and broadcast programs on university-owned UHF and cable television stations.

In addition to the extension service workers at the county level, State extension specialists at land-grant universities coordinate the efforts of county agents. State extension agents keep abreast of the latest research in their fields of study and develop ways of using the research in extension work at the county level. Some State extension workers may be on a split assignment and teach at the university. Also, about 200 agricultural extension specialists are employed by the Extension Service of the U.S. Department of Agriculture in Washington, D.C.

Working Conditions

Cooperative Extension Service workers generally have very favorable working environments. The job has variety. Agents do much of their paperwork and planning in offices, but they also spend considerable time in the field. Agricultural extension agents, for example, may not go into the office at all on some days. Instead, they may visit farmers and help them develop more productive farming methods. They also may go to local radio stations to tape their weekly radio shows, or they may go to the State university to attend seminars on recent developments.

Extension work is not a 9 to 5 job, however. Farmers, for example, often are not able to attend meetings during the busy daylight hours, so extension agents often must conduct informational meetings during the evenings. During these meetings, they may discuss new farming methods or how new laws will affect farmers.

The job offers numerous opportunities for personal satisfaction. Helping a farmer become more productive or helping a family develop better nutritional habits, can be re-

warding. Many extension agents also enjoy being asked their opinions on a variety of subjects.

Most extension service offices are located in small towns. As a result, extension work may be an ideal career for persons who wish to live outside the city.

Places of Employment

More than four-fifths of the approximately 16,000 Cooperative Extension Service agents in 1978 were employed by counties throughout the United States. Almost all of the more than 3,000 counties have county staffs. Depending on the population of the county, staffs range in size from one agent, who serves a wide variety of interests, to a dozen or more agents, each serving a highly specialized need. Most of the remaining extension agents are employed by State extension services located on the campuses of land-grant universities. A few work for regional staffs serving multicounty areas, and a small number are employed by the Extension Service of the U.S. Department of Agriculture. In addition, a few work in urban areas, mostly organizing 4-H activities for youth.

Training, Other Qualifications, and Advancement

Cooperative Extension Service agents are required to be proficient in disciplines related to the needs of their clientele. They must have a bachelor's degree in their subject-matter field. In addition, training in educational techniques and in a communications field, such as journalism, is extremely helpful.

Often, they receive specific instruction in extension work in a pre-induction training program, and can improve their skills through regular in-service training programs that cover both educational techniques and the subject matter for which they are responsible. Besides being proficient in their subject matter, extension workers must like to work with people and to help them.

In most States, specialists and agents assigned to multicounty and State staff jobs are required to have at least one advanced degree, and, in many, they must have a Ph. D.

Employment Outlook

The employment of Cooperative Extension Service workers is expected to increase more slowly than the average for all occupations through the 1980's. Nevertheless, as agricultural technology becomes more complicated, more extension workers trained in education and communications will be needed to disseminate information concerning advances in agricultural research and technology to the farm population. Also, modern farmers often are college educated and, thus, more likely to use innovative farming practices. This may increase the demand for extension agents since extension agents relay advances in farming practices from researchers to farmers.

Earnings

According to the limited data available, county extension agents had average annual earnings of just over $17,000 in 1978. Earnings vary, however, by State, amount of education, and experience. Earnings also vary somewhat by area of specialization. Agricultural extension agents and community resource development specialists, for example, had the highest average annual earnings, almost $19,000, while home economics agents and 4-H club agents each had average annual earnings of under $16,000 in 1978.

Related Occupations

Extension workers spend most of their time working directly with others, passing on new ideas and helping farmers implement them. Other occupations that involve helping people to help themselves include counselors, dieticians, home economists, homemakers, teachers, social workers, and agricultural chemical salesworkers.

Sources of Additional Information

Additional information is available from County Extension offices, the State Director of the Cooperative Extension Service located at each land-grant university, or the Extension Service, U.S. Department of Agriculture, Hyattsville, Md. 20782.

Counseling Occupations

At some point in their lives, most people seek advice or assistance for personal, educational, or vocational problems. These problems may be relatively minor, such as a conflict in a student's class schedule, or may involve serious emotional or physical disabilities. Regardless of the problem, counselors often are the ones to whom people turn for help.

Counselors may specialize in a specific area and work setting. Some deal primarily with school children, while others work only with adults. Some counselors are trained to assist in educational or vocational planning; others help people deal with their day to day problems. Whatever the area of specialization, counselors help people understand themselves—their capabilities and potential—so that they can make and carry out decisions and plans for a satisfying and productive life.

This chapter covers four counseling specialties: School counseling, rehabilitation counseling, employment counseling, and college career planning and placement.

School counselors are the largest counseling group. They are primarily concerned with the personal, social, and educational development of students.

Rehabilitation counselors help persons with physical, mental, or social handicaps to become more productive individuals.

Employment counselors advise people—the unemployed or unskilled, for example—who cannot find a job or have problems in career choice and planning.

College career planning and placement counselors help college students examine their own interests, abilities, and goals; explore career alternatives; and make and follow through with a career choice.

Persons who want to enter the counseling field must be interested in helping people and have an ability to understand their behavior. A pleasant but strong personality that instills confidence in clients is desirable. Counselors also must be patient, sensitive to the needs of others, and able to communicate orally as well as in writing.

In addition, many psychologists, social workers, and college student personnel workers also do counseling. These and other fields which entail some counseling, such as teaching, health, law, religion, and personnel, are described elsewhere in the *Handbook*.

School Counselors

(D.O.T. 045.107-010)

Nature of the Work

Uncertainty about a career choice, difficulty with a particular class, or an unhappy home life are examples of problems that many students face. Usually these problems cannot be solved by the student alone; profes-

School counselors help students gain a better understanding of their interests, abilities, and personality characteristics.

sional assistance often is needed. Most schools hire counselors to give individual attention to students' educational, career, and social development.

The counselor's role is to help students understand themselves better—their abilities, talents, personality characteristics, and career options, for example. To accomplish this, counselors may use tests and individual or group counseling; sometimes they develop specialized methods or seek the assistance of community resource persons.

When helping students in career choices, counselors often administer and evaluate tests. Some counselors also have responsibility for a career information center and the school's career education program. The counselor may, for example, suggest ways in which a math teacher can incorporate into a lesson information on occupations that require mathematics. Or the counselor may arrange field trips to factories and business firms or show films which provide a view of real work settings. The desired result is a student who is more aware of careers that match his or her talents, likes, and abilities and who can, with the assistance of the counselor, develop an educational and career plan.

School counselors must keep up-to-date on opportunities for educational and vocational training beyond high school to counsel students who want this information. They must keep informed about training programs in 2- and 4-year colleges; in trade, technical, and business schools; apprenticeship programs; and available federally supported programs. Counselors also advise students about educational requirements for entry level jobs, job changes caused by technological advances, college entrance requirements, and places of employment.

Counselors in junior high and high schools often help students find part-time jobs, either to enable them to stay in school or to help them prepare for their vocation. They may help both graduates and dropouts to find jobs or may direct them to community employment services. They also may conduct surveys to learn more about hiring experiences of recent graduates and dropouts, local job opportunities, or the effectiveness of the educational and guidance programs.

Counselors work with problems affecting the school as a whole as well as those affecting only one or two individuals. If drug abuse is a problem, counselors may, for example, initiate group counseling sessions to discuss the dangers of taking drugs. Or they may speak individually with students and their parents.

Counselors work closely with other staff members of the school, members of the community, and parents. Often, teachers and counselors confer about problems affecting a student or group of students. A teacher may refer a student who appears to have problems dealing with classmates to a counselor who will attempt to find the cause. Counselors may arrange meetings with parents or community agencies, such as mental health organizations, if a student's problems are serious.

Elementary school counselors help children to make the best use of their abilities by identifying these and other basic aspects of the child's makeup at an early age, and by evaluating any learning problems. Methods used in counseling grade school children differ in many ways from those used with older students. Observations of classroom and play activity furnish clues about children in the lower grades. To better understand children, elementary school counselors spend much time consulting with teachers and parents. They also work closely with other staff members of the school, including psychologists and social workers.

Some school counselors, particularly in secondary schools, teach classes in occupational information, social studies, or other subjects. They also may supervise school clubs or other extracurricular activities, often after regular school hours.

Working Conditions

Most school counselors work the traditional 10-month school year with a 2-month vacation. They work closely with school administrators, teachers, and parents as well as students. Helping students solve specific problems can be emotionally exhausting.

Places of Employment

About 45,000 people worked full time as public school counselors during 1978. Most counselors work in large schools. An increasing number of school districts, however, provide guidance services to their small schools by assigning more than one school to a counselor.

Training, Other Qualifications, and Advancement

Most States require school counselors to have counseling and teaching certificates. However, a growing number of States no longer require teacher certification. Depending on the State, a master's degree in counseling and from 1 to 5 years of teaching experience usually are required for a counseling certificate. People who plan to become counselors should learn the requirements of the State in which they plan to work since requirements vary among States and change rapidly.

College students interested in becoming school counselors usually take the regular program of teacher education, with additional courses in psychology and sociology. In States where teaching experience is not a requirement, it is possible to major in a liberal arts program. A few States substitute a counseling internship for teaching experience. In some States, teachers who have completed part of the courses required for the master's degree in counseling are eligible for provisional certification and may work as counselors under supervision while they take additional courses.

Counselor education programs at the graduate level are available in more than 450 colleges and universities, usually in the departments of education or psychology. One to two years of graduate study are necessary for a master's degree. Most programs provide supervised field experience.

Subject areas of required graduate level courses usually include appraisal of the individual student, individual counseling procedures, group guidance, information service

for career development, professional relations and ethics, and statistics and research.

The ability to help young people accept responsibility for their own lives is important for school counselors. They must be able to coordinate the activity of others and work as part of the team which forms the educational system.

School counselors may advance by moving to a larger school; becoming director or supervisor of counseling or guidance; or, with further graduate education, becoming a college counselor, educational psychologist, school psychologist, or school administrator. Usually college counselors and educational psychologists must have the Ph. D. degree.

Employment Outlook

Employment of school counselors is likely to grow more slowly than the average for all occupations through the 1980's as declining school enrollments coupled with financial constraints limit demand. Future growth in counselor employment will depend largely on the amount of funds that the Federal Government provides to the States, particularly funding for career education.

Earnings

According to a recent survey, the average salary of school counselors in 1978 was around $17,700. However, salaries varied by size, grade level, and locality of the school. Average salaries of school counselors ranged from around $9,200 to about $30,500. School counselors generally earn more than teachers at the same school. (See statements on kindergarten and elementary school teachers and secondary school teachers.)

In most school systems, counselors receive regular salary increments as they obtain additional education and experience. Some counselors supplement their income by part-time consulting or other work with private or public counseling centers, government agencies, or private industry.

Related Occupations

School counselors help students gain a better understanding of their interests, abilities, and personality characteristics, and also help them deal with personal, social, academic, and vocational problems. Other occupations involved in helping people in similar ways include caseworkers, clinical psychologists, elementary school teachers, parole officers, probation officers, social workers, secondary school teachers, and vocational rehabilitation counselors.

Sources of Additional Information

State departments of education can supply information on colleges and universities that offer training in guidance and counseling as well as on the State certification requirements.

Additional information on this field of work is available from:

American School Counselor Association, 22 Skyline Place, Suite 400, 5203 Leesburg Pike, Falls Church, Va. 22041.

Employment Counselors

(D.O.T. 045.107-010 and -018)

Nature of the Work

All too often, people look for jobs before they develop realistic career goals, acquire the proper training, or learn enough about the job market. They run the risk of becoming dissatisfied with their work or failing to find a job at all. Employment counselors (sometimes called vocational counselors) provide people with career information and other kinds of help in getting a job.

Most employment counselors work in State employment service offices or in community agencies. Community agencies, which may be either public or private, include career planning and placement programs for special groups such as women and minorities; social service agencies that counsel school dropouts, drug abusers, or ex-offenders; and neighborhood organizations that help direct young people towards meaningful roles in society.

Counselors interview jobseekers to learn about their interests, training, work experience, work attitudes, physical capacities, and personal traits. If necessary, they may arrange for aptitude and achievement tests. To learn more about the jobseeker's aptitudes, skills, and interests, they may contact a former employer or school principal. The counselor then describes a number of suitable occupations and discusses the client's employment prospects in each field.

Often, employment counselors refer clients to other agencies for additional help. For example, if a person stutters, the employment counselor might suggest speech therapy at a local health facility. A counselor might refer a client with outdated job skills to a training program, arrange an equivalency exam for someone who has not finished high school, or suggest child care that would fit a working parent's schedule. Proper referral requires that employment counselors be thoroughly familiar with community resources and that they keep in touch with other social service and health professionals.

Counselors may suggest specific employers and appropriate ways of applying for work. In some cases, counselors may contact employers about jobs for applicants, although placement specialists often handle this work in State employment service agencies. After job placement or entrance into training, counselors may follow up to determine if the applicant needs additional assistance.

The unemployed and graduates looking for their first job are typical clients that an employment counselor might see during an ordinary workday. Some clients have skills to start work immediately; others who have not completed school or lack marketable skills need assistance such as remedial education, job training, or advice about interviewing and filling out application forms. People with job market disadvantages often need extensive counseling. They may need help to resolve emotional, family, or other fundamental problems that prevent their securing and holding a job.

In recent years, the employment problems of many special groups have come into sharper focus. Veterans, school dropouts, handicapped people, older workers, women, and minorities sometimes need special help to turn talents and abilities into marketable skills. Employment counselors who work with these clients increasingly use group counseling, and follow-up counseling for clients who have begun working.

Working Conditions

Counselors usually work about 40 hours a week, but some in community agencies may have evening appointments to counsel clients already employed.

Working space is often limited, but offices are designed to be free from noise and distractions to allow for confidential discussions with clients.

Places of Employment

In 1978 about 3,100 persons worked in employment counseling or related technical and supervisory positions in State employment service offices in every large city and many smaller towns. In addition, about 3,000 employment counselors worked for various private or community agencies, primarily in larger cities. Some worked in institutions such as prisons, training schools for delinquent youths, and mental hospitals. Some counselors teach in graduate training programs or conduct research.

Training, Other Qualifications, and Advancement

All States require counselors in public employment offices to meet State civil service or merit system requirements. However, these minimum educational and experience standards vary by State. Some require a master's degree in counseling or a related field; others require only a high school diploma. Experience in counseling, interviewing, and job placement also may be required, particularly for those without advanced degrees.

Applicants with graduate degrees and additional experience may enter at higher levels on the counselor career ladder. In many States, individuals with extensive experience in the employment service may enter the counselor career ladder, take the prescribed university course, and gain the necessary experience to move upward.

Although minimum entrance requirements are not standardized among private

Counselors often administer aptitude and achievement tests.

and community agencies, most prefer, and some require, a master's degree in vocational counseling or in a related field such as psychology, personnel administration, counseling, guidance education, or public administration. Many private agencies prefer to have at least one staff member who has a doctorate in counseling psychology or a related field. For those lacking an advanced degree, employers usually emphasize experience in closely related work such as rehabilitation counseling, employment interviewing, school or college counseling, teaching, social work, or psychology.

In each State, the public employment service offices provide in-service training programs for their new counselors or trainees. In addition, both their new and experienced counselors often enroll for training at colleges and universities during the regular academic year or at institutes or summer sessions. Private and community agencies also often provide in-service training opportunities.

College students who wish to become employment counselors should study psychology and basic sociology. Graduate level courses include techniques of counseling, psychological principles and psychology of careers, assessment and appraisal, cultures and environment, and occupational information. Counselor education programs at the graduate level are available in more than 450 colleges and universities, mainly in departments of education or psychology. To obtain a master's degree, students must complete 1 to 2 years of graduate study including actual supervised experience in counseling.

Persons aspiring to be employment counselors should have a strong interest in helping others make and carry out vocational decisions. They should be able to work independently and to keep detailed records.

Well-qualified counselors with experience may advance to supervisory or administrative positions as directors of agencies, area supervisors of guidance programs, consultants, or counseling professors.

Employment Outlook

Qualified applicants are expected to face competition for jobs as employment counselors through the 1980's. Employment in this small occupation depends largely on Federal funding for the State, local, and community agencies that provide job counseling. In recent years, the number of counselors in State offices has changed very little, but some new jobs have opened up in community agencies funded under the Comprehensive Employment and Training Act (CETA).

In addition to new jobs, some openings for employment counselors will result from the need to replace those who die, retire, or transfer to other fields.

Earnings

Salaries of employment counselors in State employment services vary considerably from State to State. In 1978, salaries ranged from about $7,000 for entry level positions to $21,000 for experienced counselors. The average starting salary for beginning workers was $10,506, while experienced counselors averaged $13,814.

According to the limited data available, the average starting salary for counselors in private, nonprofit organizations in 1978 was $12,500. The average for experienced workers was $18,000. In general, salaries of employment counselors are about one and one-half times as high as average earnings for all nonsupervisory workers in private industry, except farming.

Counselors generally receive benefits such as vacations, sick leave, pension plans, and insurance coverage.

Related Occupations

Other professionals interview people, discuss their problems, and suggest useful solutions. Among them are school psychologists, guidance counselors, parole officers, probation officers, and social workers.

Sources of Additional Information

For general information on employment or vocational counseling, contact:

American Personnel and Guidance Association, 2 Skyline Place, Suite 400, 5203 Leesburg Pike, Falls Church, Va. 22041.

The administrative office for each State's employment security agency can supply specific information about local job opportunities, salaries, and entrance requirements for positions in public employment service offices. For information, contact the nearest local office of your public employment service under State Government listings in your local telephone directory. A list of all public employment service offices may be obtained by writing to:

U.S. Department of Labor, Employment and Training Administration, U.S. Employment Service, 601 D St. NW., Washington, D.C. 20213.

Rehabilitation Counselors

(D.O.T. 045.107-042)

Nature of the Work

Each year more mentally, physically, and emotionally disabled persons become self-sufficient and productive citizens. They find employment in a wide variety of occupations previously thought too complex or physically demanding for them to handle. A growing number are studying in colleges and technical schools throughout the United States. One member of the team of professionals

who help disabled individuals leave a sheltered environment to lead as normal a life as possible is the rehabilitation counselor.

Rehabilitation counselors begin their work by learning about their client. They may read school reports, confer with medical personnel, and talk with family members to determine the exact nature of the disability. They also discuss with physicians, psychologists, and occupational therapists the types of skills the client can learn. At that point, the counselor begins a series of discussions with the client to explore training and career options. The counselor then uses this information to develop a rehabilitation plan.

A rehabilitation program generally includes specific job training, as well as other specialized training the disabled person may need. When working with a blind individual, for example, the counselor may arrange for training with seeing-eye dogs. The disabled person then may spend a few months learning to cross streets and ride public transportation systems. Throughout this period, the counselor and disabled client meet regularly to discuss progress in the rehabilitation program and any problems that may arise.

Counselors also must find jobs for disabled persons and often make followup checks to insure that placement has been successful. If the new employee has a specific problem on the job, the counselor may suggest adaptations to the employer.

Because job placement is such an important aspect of a counselor's work, he or she must keep in touch with members of the business community to learn the type of jobs available and training required. They also try to alleviate any fears on the part of employers about the suitability of hiring handicapped individuals. As a result, counselors may spend time publicizing the rehabilitation program to business and community associations.

An increasing number of counselors specialize in a particular area of rehabilitation; some may work almost exclusively with blind people, deaf people, alcoholics, drug addicts, the mentally ill, or retarded persons. Others may work almost entirely with persons living in poverty areas.

The amount of time spent counseling each client varies with the severity of the disabled person's problems as well as with the size of the counselor's caseload. Some rehabilitation counselors are responsible for many persons in various stages of rehabilitation; on the other hand, less experienced counselors, or those working with the severely disabled, may work with relatively few cases at a time.

Working Conditions

Rehabilitation counselors generally work a 40-hour week or less, with some overtime work required to attend community and civic meetings in the evening. They may spend only part of their time in their offices counseling and performing necessary paperwork. The remainder of their time is spent away from the office, working with prospective employers, training agencies, and the disabled person's family. The ability to drive a car often is necessary for this work.

Rehabilitation counselors begin their work by learning about their client.

Rehabilitation counselors must maintain close contact with handicapped clients and their families over many months or even years. The counselor often has the satisfaction of watching day-by-day progress in the disabled person's fight for independence. At other times, however, the counselor may experience the disappointment of a client's failures.

Places of Employment

About 19,000 persons worked as rehabilitation counselors in 1978. About 70 percent worked in State and local rehabilitation agencies financed cooperatively with Federal and State funds. Some vocational rehabilitation specialists and counseling psychologists worked in the Veterans Administration's vocational rehabilitation program. Rehabilitation centers, sheltered workshops, hospitals, mental health centers, labor unions, insurance companies, special schools, centers for independent living, and other public and private agencies with rehabilitation programs and job placement services for the disabled employ the rest.

Training, Other Qualifications, and Advancement

A bachelor's degree with courses in counseling, psychology, and related fields is the minimum educational requirement for rehabilitation counselors. However, employers are placing increasing emphasis on the master's degree in rehabilitation counseling or vocational counseling, or in related subjects such as psychology, education, and social work. Work experience in fields such as vocational counseling and placement, psychology, education, and social work is an asset for securing employment as a rehabilitation counselor. Most agencies have work-study programs whereby employed counselors can earn graduate degrees in the field.

In 1978, 84 colleges and universities accredited by the Council on Rehabilitation Education offered graduate programs in rehabilitation counseling. Usually, 1 1/2 to 2 years of study are required for the master's degree. Included is a period of actual work experience as a rehabilitation counselor under the close supervision of an instructor. Besides a basic foundation in psychology, courses generally included in master's degree programs are counseling theory and techniques, occupational and educational information, and community resources. Other requirements may include courses in placement and followup, tests and measurements, psychosocial effects of disability, and medical and legislative aspects of rehabilitation.

To earn the doctorate in rehabilitation counseling or in counseling psychology may take a total of 4 to 6 years of graduate study. Intensive training in psychology and other social sciences, as well as in research methods, is required.

Many States require that rehabilitation counselors be hired in accordance with State civil service and merit system rules. In most cases, these regulations require applicants to pass a competitive written test, sometimes supplemented by an interview and evaluation by a board of examiners. In addition, some private organizations require rehabilitation counselors to be certified. To become certified, counselors must pass exams administered by the Commission on Rehabilitation Counselor Certification.

Because rehabilitation counselors deal

with the welfare of individuals, the ability to accept responsibility is important. It also is essential that they be able to work independently and be able to motivate and guide the activity of others. Counselors who work with the severely disabled need unusual emotional stability. They must be very patient in dealing with clients who often are discouraged, angry, or otherwise difficult to handle.

Counselors who have limited experience usually are assigned the less difficult cases. As they gain experience, their caseloads are increased and they are assigned clients with more complex rehabilitation problems. After obtaining considerable experience and more graduate education, rehabilitation counselors may advance to supervisory positions or top administrative jobs.

Employment Outlook

Because most State and private rehabilitation agencies are funded primarily by the Federal Government, the extent of employment will depend largely on the level of government spending. Additional positions, however, are expected to become available in private companies, such as manufacturing and service firms, for rehabilitation counselors to help in equal employment opportunity efforts. Colleges and universities that employ coordinators of services to handicapped students are another source of increasing employment opportunities for rehabilitation counselors. In addition to growth needs, many counselors will be required annually to replace those who die, retire, or leave the field for other reasons.

Earnings

The average minimum salary of rehabilitation counselors in State agencies was about $11,500 in 1978; the average maximum salary was $15,200.

The Veteran's Administration paid counseling psychologists with a 2-year master's degree and 1 year of subsequent experience—and those with a Ph. D.—starting salaries of $19,263 in early 1979. Those with a Ph. D. and a year of experience, and those with a 2-year master's degree and much experience, started at $23,087. In addition, the Veteran's Administration employed a number of vocational rehabilitation specialists—generally with master's degrees—at starting salaries of $13,014 to $19,263. The average salary of vocational rehabilitation counselors in the Federal Government was $20,100 in 1978.

Related Occupations

Rehabilitation counselors help mentally, physically, and emotionally disabled individuals become self-sufficient and productive citizens. Related occupations include: Industrial-organizational psychologists, school counselors, employment counselors, parole officers, probation officers, social workers, and occupational therapists.

Sources of Additional Information

For information about rehabilitation counseling as a career, contact:

American Psychological Association, Inc., 1200 17th St. NW., Washington, D.C. 20036.

American Rehabilitation Counseling Association, 2 Skyline Place, 5203 Leesburg Pike, Suite 400, Falls Church, Va. 22041.

National Rehabilitation Counseling Association, 1522 K St. NW., Washington, D.C. 20005.

A list of educational institutions offering training in rehabilitation counseling can be obtained from:

Division of Manpower Development, Rehabilitaton Services Administration, Department of Education, Room 3321, Mary E. Switzer Building, 330 C St. SW., Washington, D.C. 20201.

Information on certification requirements and procedures is available from:

Commission on Rehabilitation Counselor Certification, 8 South Michigan Ave., Suite 3301, Chicago, Ill. 60603.

College Career Planning and Placement Counselors

(D.O.T. 166.167-014 and .267-010)

Nature of the Work

Choosing a career is a decision all college students face. Identifying a field of work that matches one's likes, dislikes, personal qualities, and talents can be difficult and time consuming. Once a career choice has been made, the job search begins in earnest—writing resumes, searching out prospective employers, and requesting interviews. Looking for a job can be an anxiety-producing and discouraging experience.

Career planning and placement counselors help bridge the gap between education and work by assisting students in all phases of career decisionmaking and planning. These counselors, sometimes called *college placement officers*, provide a variety of services to college students and alumni. They encourage students to examine their interests, abilities, and goals, and then help them explore career alternatives. They may help students test career interests by arranging internships, field placements, or part-time or summer employment. Counselors discuss the kinds of jobs open to college graduates with a particular major and help students evaluate the pros and cons of further training.

Because a liberal arts curriculum is not specifically career oriented, these students in particular can benefit from the knowledge and experience of college career planning and placement counselors. Even in areas like accounting or engineering, where the correlation between college major and career is quite direct, students benefit from counseling assistance in deciding where and how to look for a job.

Career planning and placement counselors also arrange for job recruiters to visit the campus to discuss their firms' personnel needs and to interview applicants. They provide employers with information about students and inform students about business operations and personnel needs in industry. A counselor may, for example, explain to students that workers in certain industries are subject to layoffs. In order to counsel students adequately, counselors must keep abreast of labor market information, including wages, hours, training, and employment prospects. This means reading career and counseling literature and maintaining contact with industry and government recruiters.

Some career planning and placement counselors, especially those in community and junior colleges, advise school administrators on curriculum and course content. They may consult employers and then suggest courses that would prepare students more adequately for local jobs. In addition, some placement directors and counselors, especially those working in small schools, also teach. All counselors maintain a library of career guidance and recruitment information.

Placement counselors may specialize in areas such as law, education, or part-time and summer work. However, the extent of specialization usually depends upon the size and type of college as well as the size of the placement staff.

Working Conditions

Working as they do with students, alumni, faculty, and employers, college career planning and placement counselors have people-oriented jobs. Their work entails a great deal of contact with others—in counseling sessions, meetings, public appearances, and telephone calls. This work can be deeply gratifying because counselors share in the growth and development of students. In addition, they are constantly exposed to new ideas and developments in the working world. Many persons pursue careers as college counselors because of the intellectual stimulation and other intangible benefits of an academic environment.

Places of Employment

Nearly all 4-year colleges and universities and many community and junior colleges provide career planning and placement services to their students and alumni. Large colleges and junior colleges may employ several counselors working under a director of career planning and placement activities. In many institutions, however, a combination of placement functions is performed by one director aided by a clerical staff. In small colleges and junior colleges, the functions of career counselors may be performed on a

Helping students select courses is an interesting and challenging part of the job.

part-time basis by members of the faculty or administrative staff. Universities frequently have placement officers for each major branch or campus.

About 5,000 persons worked as career planning and placement counselors in 2- and 4-year colleges and universities in 1978.

Training, Other Qualifications, and Advancement

Although no specific educational program exists to prepare persons for career planning and placement work, colleges and universities increasingly seek applicants with a master's degree in counseling, college student personnel work, or a behavioral science. One or two years of work experience in business or industry are invaluable preparation for this occupation.

In 1978, over 100 colleges and universities offered graduate programs in college student personnel work. Graduate courses that are helpful for career planning and placement counseling include counseling theory and techniques, vocational testing, theory of group dynamics, personnel management, organizational behavior, and industrial relations.

Some people enter the career planning and placement field after gaining a broad background of experience in business, industry, government, or educational organizations. An internship in a career planning and placement office also is helpful.

Like other counselors, college career planning and placement counselors need certain personal traits. A respect and concern for the individual, based on a belief in the student's self-worth and capacity for growth, is important in this field. Counselors must be able to communicate with and gain the confidence of students, faculty, and employers in order to work effectively with them. Intellectual curiosity and openmindedness are important, for counselors need to develop and maintain an understanding of the personal, economic, and environmental forces that affect career decisions. People in this field should be energetic and able to work under pressure because they must organize and administer a wide variety of activities.

Advancement for career planning and placement professionals usually is through promotion to an assistant or associate position, director of career planning and placement, director of student personnel services, or some other higher level administrative position. A doctoral degree may be helpful for such advancement. However, the extent of such opportunity usually depends upon the type of college or university and the size of the staff.

Employment Outlook

Employment of college career planning and placement counselors is not expected to increase significantly through the 1980's. Budgetary constraints in many institutions of higher education will limit expansion of counseling and placement services. Slight increases may occur in community and junior colleges where there are no career planning and placement programs at present. While colleges and universities increasingly emphasize career planning and placement services for students at all levels including special groups—adults seeking a midcareer change as well as minority, low-income, and handicapped students—schools will tend to utilize existing staff rather than hire additional personnel.

As with other academic jobs, applicants for college career planning and placement positions will face keen competition. Those with a master's degree in counseling or a related field and experience in business or industry may have the best job prospects.

Earnings

According to a survey of colleges and universities, the median salary of student placement directors was around $18,100 a year in 1978. Salaries generally were higher in public than in private institutions, and higher in major universities and 4-year institutions than in 2-year schools.

Career planning and placement counselors frequently work more than a 40-hour week; irregular hours and overtime often are necessary, particularly during the "recruiting season." Most counselors are employed on a 12-month basis. They are paid for holidays and vacations and usually receive the same benefits as other professional personnel employed by colleges and universities.

Related Occupations

College career planning and placement counselors help students attain career goals. Others who help people attain goals and solve personal problems include school counselors, employment counselors, rehabilitation counselors, personnel and labor relations workers, social workers, psychologists, members of the clergy, teachers, and college student personnel workers.

Sources of Additional Information

A pamphlet on college career planning and placement is available from:

The College Placement Council, Inc., P.O. Box 2263, Bethlehem, Pa. 18001.

Credit Managers

(D.O.T. 168.167-054)

Nature of the Work

Over the years, buying on credit has become a customary way of doing business. Consumers use credit extensively to buy houses, cars, refrigerators, and many other goods and services. The vast majority of business purchases, such as raw materials used in manufacturing and merchandise to be sold in retail stores, also are bought on credit so that businesses do not have to tie up their cash in inventories.

For most forms of credit, a credit manager has final authority to accept or reject a credit application. In extending credit to a business (commercial credit), the credit manager or an assistant analyzes detailed financial reports submitted by the applicant, interviews a representative of the company about its management, and reviews credit agency reports to determine the firm's record in repaying debts. The manager also checks at banks where the company has deposits or previously was granted credit. In extending credit to individuals (consumer credit), detailed financial reports usually are not available. The credit manager must rely more on personal interviews, credit bureaus, and banks to provide information about the person applying for credit.

Particularly in large organizations, executive level credit managers work with other top managers to formulate a credit policy. They establish financial standards to be met by applicants and thereby determine the amount of risk that their company will accept when offering its products or services for sale on credit. Managers must cooperate with the sales department in developing a credit policy liberal enough to allow the company's sales to increase and yet strict enough to deny credit to customers whose ability to repay their debts is questionable. Many credit managers establish office procedures and supervise workers who gather information, analyze facts, and perform general office duties in a credit department; they include application clerks, collection workers, bookkeepers, and secretaries.

In small companies that handle a limited number of accounts, credit managers may do much of the work of granting credit themselves. They may interview applicants, analyze the information gained in the interview, and make the final approval. They frequently must contact customers who are unable or refuse to pay their debts. They do this through writing, telephoning, or personal contact. If these attempts at collection fail, credit managers may refer the account to a collection agency or assign an attorney to take legal action.

Working Conditions

Credit managers normally work the standard 35-40 hour workweek, but some may work longer hours. In wholesale and retail trade, for example, a seasonal increase in credit sales can produce a greater work volume.

Credit managers usually spend most of their time in the office. However, they may travel occasionally. Some credit managers, for example, attend conferences sponsored by industry and professional organizations in which they develop and discuss new techniques for credit department management.

Places of Employment

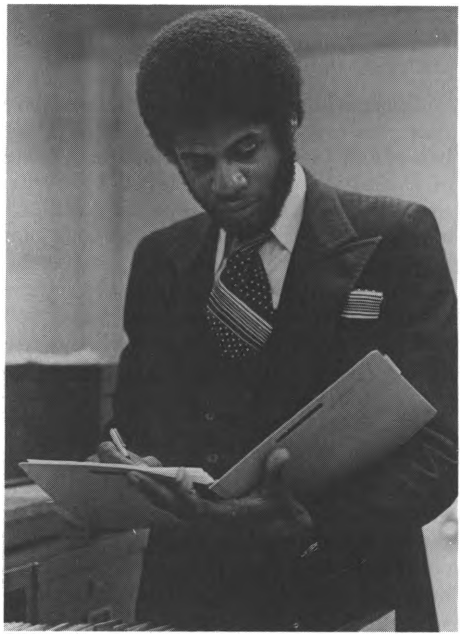
About 49,000 persons worked as credit managers in 1978. About one-half were employed in wholesale and retail trade, but many others, about 40 percent of the total, worked for manufacturing firms and financial institutions.

Although credit is granted throughout the United States, most credit managers work in urban areas where many financial and business establishments are located.

Training, Other Qualifications, and Advancement

A college degree is becoming increasingly important for entry level jobs in credit management. Employers usually seek persons who have a degree in business administration, but they may also hire graduates holding liberal arts degrees. Courses in accounting, economics, finance, computer programing, statistics, and psychology all are valuable in preparing for a career in credit management. Some employers may promote high school graduates to credit manager positions if they have experience in credit collection or processing credit information.

Newly hired workers normally begin as management trainees and work under the guidance of more experienced personnel in the credit department. Here they gain a thorough understanding of the company's credit procedures and policies. They may analyze previous credit transactions to learn how to recognize which applicants should prove to be good customers. Trainees also learn to deal with credit bureaus, banks, and other businesses that can provide information on the past credit dealings of their customers.



Credit managers must be able to analyze detailed information in order to make a sound decision on granting credit.

Many formal training programs are available through the educational branches of the associations that service the credit and finance field. This training includes home study, college and university programs, and special instruction to improve beginners' skills and keep experienced credit managers aware of new developments in their field.

A person interested in a career as a credit manager should be able to analyze detailed information and draw valid conclusions based on this analysis. Because it is necessary to maintain good customer relationships, a pleasant personality and the ability to speak and write effectively also are characteristics of the successful credit manager.

The work performed by credit managers allows them to become familiar with almost every phase of their company's business. Highly qualified and experienced managers can advance to top-level executive positions. However, in small and medium-sized companies, such opportunities are limited.

Employment Outlook

Employment of credit managers is expected to grow more slowly than the average for all occupations through the 1980's. Despite this relatively slow growth, many jobs will become available each year due to the need to replace persons who leave the occupation. Although there will be opportunities throughout the country, employment prospects should continue to be best for well-qualified jobseekers in metropolitan areas.

The volume of credit extended rose very rapidly during the past decade. In the years ahead, businesses can be expected to require increasing amounts of credit to secure raw materials for production and obtain finished

goods for eventual resale. It is in the area of business credit where demand for credit managers will be strongest.

Consumers, whose personal incomes have risen, are expected to finance greater numbers of high-priced items. In addition, the use of credit for everyday purchases is expected to grow as demand increases for recreation and household goods as well as for consumer services. Despite increases in consumer debt, the use of computers for storing and retrieving information will enable this greater volume of information to be processed more efficiently. The use of telecommunications networks enables retail outlets to have immediate access to a central credit office, regardless of distance.

Another factor that is expected to slow the growth in the number of credit managers is the increased use of bank credit cards for consumer purchases. As stores substitute bank credit cards for their own charge accounts, retail store credit departments may be reduced or eliminated.

Earnings

In 1978, credit manager trainees who had a college degree earned annual salaries that ranged from about $11,000 to $12,000, depending on the type of employer and the geographic location of the job.

Assistant credit managers averaged about $13,000 to $16,000 a year and credit managers had average earnings of about $20,000. Individuals in top-level positions often earn over $40,000 a year.

Related Occupations

Other managerial occupations in banks, investment companies, and credit agencies include loan officers, credit card operations managers, credit union managers, risk and insurance managers, controllers, financial institution managers, letter of credit negotiators, and dealer accounts credit officers.

Sources of Additional Information

Information about a career in consumer credit may be obtained from:

International Consumer Credit Association, 243 North Lindbergh Blvd., St Louis, Mo. 63141.

National Consumer Finance Association, 1000 16th St. NW., Washington, D.C. 20036.

For information about training programs available in commercial credit, write:

National Association of Credit Management, 475 Park Ave. South, New York, N.Y. 10016.

Dancers

(D.O.T. 151.047-010)

Nature of the Work

Dancing is an ancient and worldwide art that has many different forms. Dance movements may be used to interpret an idea or a story, or they may be purely physical expressions of rhythm and sound. Professional dancers may perform in classical ballet or modern dance, in dance adaptations for musical shows, in folk, ethnic and jazz dances, and in other popular kinds of dancing. In addition to being an important art form for its own sake, dance also is used to complement other types of entertainment, such as opera, musical comedy, and television.

In dance productions, performers most often work as a group, although a few top artists do solo work. Many dancers combine stage work with teaching, where their duties may include instruction in dance history, theory, and the practice of dance notation, as well as explaining and demonstrating dance techniques and choreographing and directing stage performances. Some dancers become choreographers, who create original dances, teach them to performers, and sometimes direct and stage the presentations of their work. Others become dance directors who train dancers in new productions. A few dancers with college backgrounds go on to receive graduate level training in dance therapy. Dance therapists focus on the healing properties of movement, posture, breathing, and interaction in their work with the elderly and the mentally and physically handicapped.

Working Conditions

Dancing is strenuous, and for this reason young dancers have an advantage over older dancers in competing for jobs. Rehearsals require very long hours, often on weekends and holidays. For shows on the road, weekend travel often is required. Most stage performances take place in the evening. Many dancers retire in their thirties or transfer to related fields such as teaching dance. However, some skillful dancers continue performing beyond the age of 50. Those who become choreographers or dance directors can continue to work as long as persons in other occupations.

Unemployment rates for dancers are higher than the average for all occupations. Many qualified people cannot obtain year-round work as dancers, and are forced to supplement their incomes by other types of work.

Places of Employment

About 8,000 dancers performed on the stage, screen, and television in 1978. Many others were available for such work. The shortage of performance jobs caused some dancers to take jobs in other fields. Many taught dance in secondary schools, in junior colleges as well as four-year colleges and universities, in dance schools, and in private studios. Some dancers, trained in dance therapy, worked in mental hospitals, community mental health centers, correctional facilities, or special schools.

New York City is the hub for performing dancers. Other large cities that have promising employment opportunities, including major dance companies, include Los Angeles, Chicago, Houston, Salt Lake City, Cincinnati, Miami, San Francisco, Hartford, Pittsburgh, Minneapolis, Seattle, Boston, and Philadelphia. Dance teachers are located chiefly in large cities, but many smaller cities and towns have dance schools as well.

Agility, coordination, grace, a sense of rhythm, and a feeling for music are important qualities for aspiring dancers.

Training and Other Qualifications

Serious training for a career in dancing traditionally begins by age 12 or earlier. Ballet training is particularly disciplined, and persons who wish to become ballet dancers should begin taking lessons at the age of 7 or 8. Early and intense training also is important for the modern dancer. Most dancers have their professional auditions by age 17 or 18, but training and practice never end. For example, professional ballet dancers take from 10 to 12 lessons a week for 11 or 12 months of the year, and must spend many additional hours practicing and rehearsing. The early training a dancer receives is crucial to the later skill of the dancer, and therefore the selection of a professional dance school is very important.

Because of the strenuous training required, a dancer's general education may be minimal. However, the importance of a broad general education is becoming increasingly recognized by experts in the field. In particular, a dancer should study music, literature, and history along with the arts to help in the interpretation of dramatic episodes, ideas, and feelings. In addition, dancers should have an understanding of the structure of the human body and how it moves, of dance notation, and of historical dance styles.

Over 130 colleges and universities confer bachelor's or higher degrees in dance. College or university dance degrees are generally

offered through the departments of physical education, music, theater, or fine arts.

A college education is not essential to obtaining employment as a professional dancer. In fact, ballet dancers who postpone their first audition until graduation may compete at a disadvantage with younger dancers. On the other hand, a college degree can be helpful for the dancer who retires at an early age, as often happens, and wishes to enter another field of work. Many modern dancers are college graduates.

Although a college education is an advantage in obtaining employment as a dance teacher in a college or university, it is not necessary for one who teaches professional dance or choreography in a studio situation. Professional schools usually require teachers to have experience as performers; colleges and conservatories generally require graduate degrees, but performance experience often may be substituted. Maturity and a broad educational background also are important.

The dancer's life is one of rigorous practice and self- discipline; therefore patience, perseverence, and a devotion to dance are essential. Good health and physical stamina are necessary, both to keep in good condition and to follow the rugged travel schedule which is often required.

Seldom does a dancer perform unaccompanied. Therefore, young persons who consider dancing as a career should be able to function as part of a team. They also should be prepared to face the anxiety of unstable working conditions brought on by show closings and audition failures.

Body height and build should not vary much from the average. Good feet and normal arches also are required. Above all, one must have agility, coordination, grace, a sense of rhythm, and a feeling for music, as well as a creative ability to express oneself through dance.

Employment Outlook

Employment of dancers is expected to grow faster than the average for all occupations. However, the number of dancers seeking professional careers will continue to exceed the number of available positions, and competition will be keen. Most employment opportunities will result from replacement needs.

Employment opportunities in stage productions are limited, and competition for such positions is great. Television is partly responsible for the reduction in stage productions, yet at the same time this medium offers new outlets for dance. New professional dance companies formed by civic and community groups offer additional employment opportunities. Dance groups affiliated with colleges and universities are another source of employment. The increased general popularity of dance in recent years has resulted in increased employment opportunities in teaching dance.

Earnings

Professional dancers who perform may be members of one of the unions affiliated with the Associated Actors and Artistes of America (AFL-CIO). Dancers in opera ballet, classical ballet, and the modern dance belong to the American Guild of Musical Artists, Inc.; those on live or videotaped television belong to the American Federation of Television and Radio Artists; those who perform in films and TV belong to the Screen Actors Guild or the Screen Extras Guild; and those in musical comedies join Actors' Equity Association. Other dancers may be members of other unions, depending upon the fields in which they perform. The unions and producers sign basic agreements specifying minimum salary rates, hours of work, and other conditions of employment. However, the separate contract signed by each dancer with the producer of the show may be more favorable than the basic agreement regarding salary, hours of work, and working conditions. Many dancers employed by professional ballet or modern dance companies do not belong to unions, however.

In 1978, the minimum salary for dancers in opera and other stage productions was about $300 a week. The single performance rate for ballet dancers was $110. Dancers on tour received an allowance of $35 a day in 1978 for room and board, with the employer paying the cost of transportation. Minimum performance rates for dancers on television ranged from $340.50 to $360.25 for a 1-hour show, depending on the number of dancers in the group. The performance rate covers 18 hours of rehearsal over a 3-day period, in addition to the performance.

Salaries of dance teachers vary with the location and the prestige of the school in which they teach. Dance instructors in colleges and universities are paid on the same basis as other faculty members. (For more information, see the *Handbook* statement on College and University teachers.)

The normal workweek is 30 hours (6 hours per day maximum) spent in rehearsals and matinee and evening performances. Extra compensation is paid for additional hours worked.

Dancers are entitled to some paid sick leave and various health and welfare benefits provided by their unions, to which the employers contribute. Dance instructors in schools receive benefits comparable to those of other teachers.

Related Occupations

Dancers express ideas and emotions through their body movements. They need grace, rhythm, body control, and the creative ability to express themselves through dance. Some related occupations include acrobats, choreographers, dance critics, dance instructors, dance notators, dance therapists, and recreation workers.

Sources Of Additional Information

A list of colleges and universities that teach dance, including details on the types of courses offered, is available from:

National Dance Association, a Division of the American Alliance for Health, Physical Education, Recreation, and Dance, 1201 16th St. NW., Washington, D.C. 20036.

For information on all aspects of dance, including job listings, contact:

American Dance Guild, 152 W. 42nd St. Room 828, New York, N.Y. 10036. Enclose a stamped, self-addressed envelope.

Information about the field of dance therapy, along wih a list of schools that offer degrees in the field, is available from:

American Dance Therapy Association, Suite 230, 2000 Century Plaza, Columbia, Md. 21044.

Dental Hygienists

(D.O.T. 078.361-010)

Nature of the Work

Dental hygienists are oral health clinicians and educators who help the public develop and maintain good oral health. As members of the dental health team, dental hygienists may perform preventive and therapeutic services under the supervision of the dentist. Specific responsibilities of the hygienist vary, depending on the law of the State where the hygienist is employed, but may include removing deposits and stains from patients' teeth; providing instructions for patient self-care and nutritional counseling; and applying topical fluoride to prevent tooth decay. They take medical and dental histories, expose and develop dental X-ray films, make impressions of teeth for study models, and prepare other diagnostic aids for use by the dentist. Pain control and restorative procedures also may be performed by dental hygienists in some States.

Dental hygienists who work in school systems serve in several capacities. Clinical functions include examining children's teeth, assisting the dentist in determining the dental treatment needed, and reporting the findings to parents. They also scale and polish teeth and give oral hygiene instructions. In addition, they develop and deliver classroom and assembly programs on oral health.

A few dental hygienists assist in research projects. Those having advanced training may teach in schools of dental hygiene.

Working Conditions

Dental hygienists usually work in clean, well-lighted offices. Important health safeguards for persons in this occupation are regular medical checkups and strict adherence to established procedures for using X-ray equipment. Dental hygienists must have manual dexterity because they use various

dental instruments with little room for error within a patients' mouth. They also must empathize with patients who often are under stress.

Places of Employment

About 35,000 persons worked as dental hygienists in 1978. Many are employed part time. Most work in private dental offices; some may contract their services to several dentists or dental offices. Public health agencies, school systems, industrial plants, clinics, hospitals, dental hygiene schools, and the Federal Government are other sources of employment for dental hygienists. Some graduates of bachelor's degree programs are commissioned officers in the Armed Forces.

Training, Other Qualifications, and Advancement

Dental hygienists must be licensed. To obtain a license, a candidate must graduate from an accredited dental hygiene school and pass both a written and a clinical examination. For the clinical examination, the applicant is required to perform dental hygiene procedures, such as removing deposits and stains from a patient's teeth. In 1978, candidates in 48 States and the District of Columbia could complete part of the State licensing requirements by passing a written examination given by the National Board of Dental Examiners. Few States permit dental hygienists licensed in other States to practice in their jurisdictions without further examination.

In 1978, 197 schools of dental hygiene in the United States were accredited by the Commission on Accreditation of Dental and Dental Auxiliary Educational Programs. Most programs grant an associate degree; others lead to a bachelor's degree. A few institutions offer both types of programs. Six schools offer master's degree programs in dental hygiene.

Completion of an associate degree program usually is sufficient for the dental hygienist who wants to practice in a private dental office. To do research, teach, and work in public or school health programs, at least a bachelor's degree usually is required. Dental hygienists with a master's degree work as teachers or administrators in dental hygiene and dental assisting training programs, public health agencies, and in associated research.

Competition is keen for admission to dental hygiene schools. The minimum requirement for admission to a school of dental hygiene is graduation from high school. Several schools that offer the bachelor's degree admit students to the dental hygiene program only after they have completed 2 years of college. Many schools also require that applicants take an aptitude test given by the American Dental Hygienists' Association. Dental hygiene training given in the Armed Forces usually does not fully prepare one to pass the licensing exam, but credit for that training may be granted to those who seek admission to accredited dental hygiene programs.

The curriculum in a dental hygiene program consists of courses in the basic sciences, dental sciences, clinical sciences, and liberal arts. These schools offer laboratory, clinical, and classroom instruction in subjects such as anatomy, physiology, chemistry, pharmacology, nutrition, histology (the study of tissue structure), periodontology (the study of gum diseases), dental materials, and clinical dental hygiene.

People who want to become dental hygienists should enjoy working with others. The ability to put patients at ease is helpful. Personal neatness and cleanliness, manual dexterity, and good health also are important qualities. Among the courses recommended for high school students interested in careers in this occupation are biology, health, chemistry, speech, and mathematics.

Dental hygienists who work in school systems examine, scale, and polish children's teeth and instruct them in proper mouth care.

Employment Outlook

Employment opportunities for dental hygienists are expected to be very good through the 1980's. Despite an anticipated rise in the number of graduates from schools of dental hygiene, the demand is expected to be greater than the supply if recent trends in enrollments continue. There also should be very good opportunities for those desiring part-time employment and for those willing to work in rural areas.

Employment of dental hygienists is expected to grow much faster than the average for all occupations because of an expanding population and the growing awareness of the importance of regular dental care. Increased participation in dental prepayment plans and more group practice among dentists should result in new jobs for dental hygienists. Dental care programs for children also may lead to more employment opportunities in this field.

Earnings

Earnings of dental hygienists are affected by the type of employer, education and experience of the individual hygienist, and the geographic location. Dental hygienists who work in private dental offices usually are salaried employees, although some are paid a commission for work performed, or a combination of salary and commission.

Dental hygienists working full time in private offices earned between $12,000 and $13,500 a year in 1978, according to the limited data available. In 1979, the Federal Government paid dental hygienists with no experience starting salaries of about $9,400 a year. Experienced dental hygienists working for the Federal Government earned average annual salaries of about $12,100.

Dental hygienists employed full time in private offices usually work between 35 and 40 hours a week. They may work on Saturdays or during evening hours. Some hygienists work for two dentists or more.

Dental hygienists who work for school systems, health agencies, the Federal Government, or State agencies have the same hours, vacation, sick leave, retirement, and health insurance benefits as other workers in these organizations.

Related Occupations

Dental hygienists relieve dentists from many routine tasks. Other occupations performing similar duties for dentists and physicians include dental assistant, dental laboratory technician, emergency medical

technician, general duty nurse, nurse anesthetist, and radiologic technologist.

Sources of Additional Information

For information about accredited programs and the educational requirements to enter this occupation, contact:

Division of Professional Development, American Dental Hygienists' Association, Suite 3400, 444 N. Michigan Ave., Chicago, Ill. 60611.

The State Board of Dental Examiners in each State, or the National Board of Dental Examiners, 211 E. Chicago Ave., Chicago, Ill. 60611, can supply information on licensing requirements.

Dentists

(D.O.T. 072)

Nature of the Work

Dentists examine teeth and other tissues of the mouth to diagnose diseases or abnormalities. They take X-rays, fill cavities, straighten teeth, and treat gum diseases. Dentists extract teeth and substitute artificial dentures designed for the individual patient. They also perform corrective surgery of the gums and supporting bones. In addition, they may clean teeth.

Dentists spend most of their time with patients, but may devote some time to laboratory work such as making dentures and inlays. Most dentists, however—particularly those in large cities—send their laboratory work to commercial firms. Some dentists also employ dental hygienists to clean patients' teeth and provide instruction for patient self-care. (See statement on dental hygienists.) Other assistants perform office work, assist in "chairside" duties, and provide therapeutic services under the supervision of the dentist.

Most dentists are general practitioners who provide many types of dental care; about 10 percent are specialists. The largest group of specialists are orthodontists, who straighten teeth. The next largest group, oral surgeons, operate on the mouth and jaws. The remainder specialize in pedodontics (dentistry for children); periodontics (treating the gums); prosthodontics (making artificial teeth or dentures); endodontics (root canal therapy); public health dentistry; and oral pathology (diseases of the mouth).

About 5 percent of all dentists teach in dental schools, do research, or administer dental health programs on a full-time basis. Many dentists in private practice do this work on a part-time basis.

Working Conditions

Most dental offices are open 5 days a week, and some dentists have evening hours. Dentists usually work between 40 and 45 hours a week, although many spend more than 50 hours a week in the office. Dentists often work fewer hours as they grow older, and a considerable number continue in part-time practice well beyond the usual retirement age.

Places of Employment

About 120,000 individuals practiced dentistry in the United States in 1978—9 of every 10 were in private practice. About 5,000 served as commissioned officers in the Armed Forces, and about 1,700 worked in other types of Federal Government positions—chiefly in the hospitals and clinics of the Veterans Administration and the Public Health Service.

Training, Other Qualifications, and Advancement

A license to practice dentistry is required in all States and the District of Columbia. To qualify for a license in most States, a candidate must graduate from a dental school approved by the American Dental Association and pass written and practical examinations. In 1978, candidates in 48 States and the District of Columbia could fulfill part of the State licensing requirements by passing a written examination given by the National Board of Dental Examiners. Most State licenses permit dentists to engage in both general and specialized practice. In 14 States, however, a dentist cannot be licensed as a "specialist" without having 2 or 3 years of graduate education and, in some cases, passing a special State examination. In the other 36 States, the extra education also is necessary, but a specialist's practice is regulated by the dental profession, not the State licensing authority. To practice in a different State, a licensed dentist usually must pass the State's examination. However, at least 21 States grant licenses without further examination to dentists already licensed in other States on the basis of their credentials. Dentists who want to teach or do research usually spend an additional 2 to 4 years in advanced dental training in programs operated by dental schools, hospitals, and other institutions of higher education.

Dental colleges require from 2 to 4 years of predental education. However, about four-fifths of the students entering dental school in 1978 had a baccalaureate or master's degree. Predental education must include courses in the sciences and humanities.

Competition is keen for admission to dental schools. In selecting students, schools give considerable weight to college grades and the amount of college education. In addition, all dental schools participate in a nationwide admission testing program, and scores earned on these tests are considered along with information gathered about the applicant through recommendations and interviews. Many State-supported dental schools also give preference to residents of their particular States.

Dental school training generally lasts 4 academic years although several institutions condense this into 3 calendar years. Studies begin with an emphasis on classroom instruction and laboratory work in basic sciences such as anatomy, microbiology, biochemistry, and physiology. Courses in clinical sciences and preclinical technique also are provided at this time. The last 2 years are spent chiefly in a dental clinic, treating patients.

The degree of Doctor of Dental Surgery (D.D.S.) is awarded by most dental colleges. An equivalent degree, Doctor of Dental Medicine (D.M.D.), is conferred by 19 schools.

Dental education is very costly because of the length of time required to earn the dental degree. However, Federal funds provide a limited number of loans for dental students, and a limited number of scholarships are available for qualifying students who agree to a minimum of 2 years' Federal service.

Dentistry requires both manual skills and a high level of diagnostic ability. Dentists should have good visual memory, excellent judgment of space and shape, and a high degree of manual dexterity, as well as scientific ability. Good business sense, self-discipline, and the ability to instill confidence are helpful for success in private practice. High school students who want to become dentists are advised to take courses in biology, chemistry, health, and mathematics.

Most dental graduates open their own offices or purchase established practices. Some gain experience with established dentists, and save money to equip an office; others may enter residency training programs in approved hospitals. Dentists who enter the Armed Forces are commissioned as captains in the Army and Air Force and as lieutenants in the Navy. Graduates of recognized dental schools are eligible for Federal Civil Service positions and for commissions (equivalent to lieutenants in the Navy) in the U.S. Public Health Service.

Employment Outlook

Employment opportunities for dentists are expected to be very good through the 1980's. Dental school enrollments have grown in recent years because of federally assisted construction of additional training facilities. However, the number of new entrants to the field through 1985 is expected to fall short of the number needed to fill openings created by growth of the occupation and by death or retirement from the profession. By 1990, however, the supply of new dentists is expected to be adequate to meet the demand for dental services.

Employment of dentists is expected to grow about as fast as the average for all occupations due to population growth, increased awareness that regular dental care helps prevent and control dental diseases, and the expansion of prepayment arrangements, which make it easier for people to afford dental services. Fluoridation of community water supplies and improved dental hygiene may pre-

Filling a tooth requires a lot of manual dexterity.

vent some tooth and gum disorders, and preserve teeth that might otherwise be extracted. However, since the preserved teeth will need care in the future, these measures may increase rather than decrease the demand for dental care. Similarly, while new techniques, equipment, and drugs, as well as the expanded use of dental hygienists, assistants, and laboratory technicians should enable individual dentists to care for more patients, these developments are not expected to offset the need for more dentists.

There will continue to be a need for dentists to administer dental public health programs and teach in dental colleges. Also, many dentists will continue to serve in the Armed Forces.

Earnings

During the first year or two of practice, dentists often earn little more than the minimum needed to cover expenses, but their earnings usually rise rapidly as their practice develops. Specialists generally earn considerably more than general practitioners. The average income of dentists in 1978 was about $50,000 a year, according to the limited information available. In the Federal Government, new graduates of dental schools could expect to start at $19,300 a year in 1979. Experienced dentists working for the Federal Government in 1979 earned average annual salaries of $39,500, with some earning as much as $47,500 a year.

Location is one of the major factors affecting the income of dentists who open their own offices. For example, in high-income urban areas, dental services are in great demand; however, a practice can be developed most quickly in small towns, where new dentists easily become known and where they may face less competition from established practitioners. Although the income from practice in small towns may rise rapidly at first, over the long run the level of earnings, like the cost of living, may be lower than it is in larger communities.

Related Occupations

Dentists examine, diagnose, and treat various oral diseases and abnormalities. Other professions which provide health services and which entail similar long and extensive training include clinical psychologist, ophthalmologist, physician, and veterinarian.

Sources of Additional Information

Persons who wish to practice in a given State should obtain the requirements for licensure from the board of dental examiners of that State. Lists of State boards and of accredited dental schools, as well as information on dentistry as a career, are available from:

American Dental Association, Council on Dental Education, 211 East Chicago Ave., Chicago, Ill. 60611.

American Association of Dental Schools, 1625 Massachusetts Ave. NW., Washington, D.C. 20036.

Students should contact the director of student financial aid at the school they attend for information about Federal or other loans and scholarships.

Dietitians

(D.O.T. 077.061 through .167)

Nature of the Work

Dietitians plan nutritious and appetizing meals to help people maintain or recover good health. They also supervise the food service personnel who prepare and serve the meals, manage dietetic purchasing and accounting, and give advice on good eating habits. Clinical dietitians form the largest group in this occupation; the others are administrative, teaching, and research dietitians. Nutritionists also are included in this field.

Administrative dietitians apply the principles of nutrition and sound management to large-scale meal planning and preparation, such as that done in hospitals, universities, schools, and other institutions. They supervise the planning, preparation, and service of meals; select, train, and direct food service supervisors and workers; budget for and purchase food, equipment, and supplies; enforce sanitary and safety regulations; and

prepare records and reports. Dietitians who are directors of dietetic departments also decide on departmental policy; coordinate dietetic services with the activities of other departments; and are responsible for the dietetic department budget, which in large organizations may amount to millions of dollars annually.

Clinical dietitians, sometimes called therapeutic dietitians, plan diets and supervise the service of meals to meet the nutritional needs of patients in hospitals, nursing homes, or clinics. Clinical dietitians confer with doctors and other members of the health care team about patients' nutritional care, instruct patients and their families on the requirements and importance of their diets, and suggest ways to maintain these diets after leaving the hospital or clinic. In a small institution, a dietitian may perform both administrative and clinical duties.

Research dietitians seek ways to improve the nutrition of both healthy and sick people. They may study nutrition science and education, food management, food service systems and equipment, or how the body uses food. Other research projects may investigate the nutritional needs of the aging, persons who have chronic diseases, or space travelers. Research dietitians usually are employed in medical centers or educational facilities, but they also may work in community health programs. (See the statement on food technologists elsewhere in the *Handbook*.)

Dietetic educators teach dietetics to members of the health care team in medical and educational institutions.

Nutritionists may counsel individuals and groups on sound nutrition practices to maintain and improve health, or they may engage in teaching and research. This work covers such areas as special diets, meal planning and preparation, and food budgeting and purchasing. Nutritionists in community health programs may be responsible for the nutrition components of preventive health and medical care services. This includes planning, developing, coordinating, and administering a nutrition program or a nutrition component within the community health program. Nutritionists work in such diverse areas as food industries, educational and health facilities, and agricultural and welfare agencies, both public and private.

An increasing number of dietitians work as consultants to hospitals and to health-related facilities. Others act as consultants to commercial enterprises, including food processors and equipment manufacturers.

Working Conditions

Although most dietitians work 40 hours a week, dietitians in hospitals may sometimes work on weekends, and those in commercial food services have somewhat irregular hours. Dietitians spend much of their time in clean, well-lighted, and well-ventilated areas, such as research laboratories, classrooms, or offices near food preparation areas. However, they do spend time in kitchens and serving areas that often are hot and steamy.

Dietitian verifies dietary needs of each patient before food tray leaves the kitchen.

Places of Employment

About 35,000 persons worked as dietitians in 1978. More than one-half work in hospitals, nursing homes, and clinics, including about 1,100 in the Veterans Administration and the U.S. Public Health Service. Colleges, universities, and school systems employ a large number of dietitians to teach or to work in their food service systems. Most of the rest work for health-related agencies, restaurants or cafeterias, and large companies that provide food service for their employees. Some dietitians are employed in the Armed Forces.

Training, Other Qualifications, and Advancement

A bachelor's degree, with a major in foods and nutrition or institution management, is the basic educational requirement for dietitians. This degree can be earned in about 240 colleges and universities, usually in departments of home economics. The college courses that usually are required include food and nutrition, institution management, chemistry, bacteriology, and physiology. Other courses that also are important are mathematics, data processing, psychology, sociology, and economics.

To qualify for professional recognition, the American Dietetic Association (ADA) recommends that graduates complete an approved dietetic internship or individual traineeship program. The internship lasts 6 to 12 months and the traineeship program 1 to 2 years. Both programs combine clinical experience under a qualified dietitian with some classroom work. In 1978, 68 internship programs were approved by the ADA. A growing number of coordinated undergraduate programs have been developed that enable students to complete their clinical experience requirement while obtaining their bachelor's degree. In 1978, there were about 70 of these programs offered by medical schools and allied health and home economics departments of colleges and universities. These programs also are approved by the ADA. Persons meeting the qualifications established by the ADA's Commission on Dietetic Registration can become Registered Dietitians (R.D.'s).

Experienced dietitians may advance to assistant or associate director or director of a dietetic department. Advancement to higher level positions in teaching and research usually requires graduate education; public health nutritionists must earn a graduate degree. Graduate study in institutional or business administration is valuable to those interested in administrative dietetics.

Persons who plan to become a dietitian should have organizational and administrative ability, as well as high scientific aptitude, and should be able to work well with a variety of people. Among the courses recommended for high school students interested in careers as dietitians are home economics, business administration, biology, health, mathematics, and chemistry.

Employment Outlook

Employment of dietitians is expected to grow faster than the average for all occupations through the 1980's to meet the nutrition and food management needs of hospitals and extended care facilities, industrial plants, and restaurants. Dietitians also will be needed to staff community health programs and to conduct research in food and nutrition. In addition to new jobs, many others will open each year to replace those who die, retire, or leave

the profession for other reasons. Opportunities should remain favorable for dietitians who wish to work part time.

In recent years, employers have used dietetic assistants trained in vocational and technical schools and dietetic technicians educated in junior colleges to help meet the demand for dietetic services. Because this situation is likely to persist, employment opportunities also should continue to be favorable for graduates of these programs.

Earnings

Entry-level salaries of hospital dietitians averaged $12,600 a year in 1978, according to a national survey conducted by the University of Texas Medical Branch. Experienced dietitians received annual salaries ranging from $15,000 to $30,000 according to the American Dietetic Association. The median salary paid by colleges and universities to dietitians with a bachelor's degree was $16,600 a year in 1978. The median salary for those with a bachelor's degree working in commercial or industrial establishments was $15,500 a year; for those in public and voluntary health agencies, $15,800. For self-employed dietitians with a bachelor's degree, the median salary was over $20,000 a year in 1978.

The entrance salary in the Federal Government for those completing an approved internship was about $13,000 in 1979. Beginning dietitians with a master's degree who had completed an internship earned about $15,900. In 1978, the Federal Government paid experienced dietitians average salaries of about $19,600 a year.

Dietitians usually receive benefits such as paid vacations, holidays, health insurance, and retirement benefits. In addition, some hospitals provide free laundry service.

Related Occupations

Dietitians apply the principles of nutrition in a variety of situations. Other workers with similar duties include food technologists, home economists, executive chefs, and food service managers.

Sources of Additional Information

For information on approved dietetic internship programs, scholarships, employment opportunities, registration, and a list of colleges providing training for a professional career in dietetics, contact:

The American Dietetic Association, 430 North Michigan Ave., Chicago, Ill. 60611.

The U.S. Office of Personnel Management, Washington, D.C. 20415, will send information on the requirements for dietetic interns and dietitians in Federal Government hospitals and for public health nutritionists and dietitians in the Public Health Service, U.S. Department of Health, Education, and Welfare; and the District of Columbia government programs.

Drafters

(D.O.T. 001.261-010 and -014; 002.261-010; 003.281-010 and 014; 005.281-010 and -014; 007.261-010, -014, -018, -022, and .281-010; 010.281-010, -014, -018; 014.281-010; and -017)

Nature of the Work

When building a satellite, television set, or bridge, workers follow drawings that show the exact dimensions and specifications of the entire object and each of its parts. Workers who draw these plans are drafters.

Drafters prepare detailed drawings based on rough sketches, specifications, and calculations made by scientists, engineers, architects, and designers. They also calculate the strength, quality, quantity, and cost of materials. Final drawings contain a detailed view of the object from all sides as well as specifications for materials to be used, procedures followed, and other information to carry out the job.

In preparing drawings, drafters use compasses, dividers, protractors, triangles, and other drafting devices. They also use technical handbooks, tables, and calculators to help solve problems.

Drafters are classified according to the work they do or their level of responsibility. *Senior drafters* translate an engineer's or architect's preliminary plans into design "layouts" (scale drawings of the object to be built). *Detailers* draw each part shown on the layout, and give dimensions, materials, and other information to make the drawing clear and complete. *Checkers* carefully examine drawings for errors in computing or recording dimensions and specifications. Under the supervision of experienced drafters, *tracers* make minor corrections and trace drawings for reproduction on paper or plastic film.

Drafters usually specialize in a particular field of work, such as mechanical, electrical, electronic, aeronautical, structural, or architectural drafting.

Working Conditions

Although drafters usually work in well-lighted and well-ventilated rooms, they often must sit and do very detailed work for long periods of time. This work may cause eye strain.

Places of Employment

About 296,000 persons worked as drafters in 1978—more than 9 out of 10 worked in private industry. Engineering and architectural firms were the single largest employers of drafters. Other major employers included the fabricated metals, electrical equipment, machinery, and construction industries.

About 20,000 drafters worked for Federal, State, and local governments in 1978. Most

In preparing drawings, drafters use rulers, triangles, and other drafting devices.

drafters in the Federal Government worked for the Defense Department; those in State and local governments were mainly in highway and public works departments. Some drafters worked for colleges and universities and nonprofit organizations.

Training, Other Qualifications, and Advancement

Persons interested in becoming drafters can acquire the necessary training in technical institutes, junior and community colleges, extension divisions of universities, and vocational and technical high schools. Some persons receive training and experience in the Armed Forces. Others qualify through on-the-job training programs combined with part-time schooling or 3- to 4-year apprenticeship programs.

Training for a career in drafting, whether in a high school or post-high school program, should include courses in mathematics, physical sciences, mechanical drawing, and drafting. Shop practices and shop skills also are helpful since most higher level drafting jobs require knowledge of manufacturing or construction methods. Many technical schools offer courses in structural design, architectural drawing, and engineering or industrial technology.

Those planning careers in drafting should be able to do freehand drawings of three-dimensional objects and also detailed work requiring a high degree of accuracy. They should have good eyesight and manual dexterity. In addition, they should be able to function as part of a team since they work directly with engineers, architects, and craft workers. Artistic ability is helpful in some specialized fields.

High school graduates usually start out as tracers. Those having post-high school technical training may begin as junior drafters. After gaining experience, they may advance to checkers, detailers, senior drafters, or supervisors. Some may become independent designers. Courses in engineering and mathematics sometimes enable drafters to transfer to engineering positions.

Employment Outlook

Employment of drafters is expected to increase about as fast as the average for all occupations through the 1980's because of industrial growth and the increasingly complex design problems of products and processes. Openings also will result from the need to replace drafters who retire, die, or move into other fields of work.

Holders of an associate (2-year) degree in drafting will have the best prospects. Many large employers already require post-secondary technical education, though well-qualified high school graduates who have studied drafting may find opportunities in some types of jobs. Photoreproduction of drawings and the expanding use of electronic drafting equipment and computers, however, will reduce the need for less skilled drafters.

Earnings

In private industry, tracers averaged about $9,800 a year in 1978, while more experienced drafters averaged between $11,200 and $13,700 a year. Senior drafters averaged about $16,900 a year in 1978.

The Federal Government paid drafters having an associate degree starting salaries of $9,391 a year in 1979. Those with less education or experience generally started at $8,366. The average Federal Government salary for all drafters was about $12,200 a year in 1978.

Related Occupations

Other occupations in which workers are required to prepare or understand detailed drawings, make accurate and precise calculations and measurements, and use various measuring devices include architects, engineering technicians, engineers, landscape architects, photogrammetrists, and surveyors.

Sources of Additional Information

General information on careers for drafters is available from:

American Institute for Design and Drafting, 3119 Price Rd., Bartlesville, Okla. 74003.

International Federation of Professional and Technical Engineers, 1126 16th St. NW., Washington, D.C. 20036.

See Sources of Additional Information in the statement on engineering and science technicians elsewhere in the *Handbook*.

Economists

(D.O.T. 050 and 090.227-010)

Nature of the Work

Economists study the way a society uses scarce resources such as land, labor, raw materials, and machinery to provide goods and services. They plan and conduct research, then compile and analyze the results, in order to determine the costs and benefits of making, distributing, and using resources in a particular way. Their research might focus on such topics as energy costs, inflation, business cycles, unemployment, tax policy, or farm prices.

Some economists are primarily theoreticians. They may develop theories to explain the causes of inflation, for example, through the use of mathematical models. Most economists, however, are concerned with practical applications of economic policy in a particular area, such as finance, labor, agriculture, transportation, energy, or health. They use their understanding of economic relationships to advise business firms, insurance companies, banks, securities firms, industry associations, labor unions, and others.

Depending on the topic they're studying, economists may have to devise methods and procedures for obtaining the data they need. Sampling techniques may be used in conducting a survey, for example, and econometric modeling techniques may be used to develop projections. Preparing reports usually is an important part of the economist's job. He or she may be called upon to review and analyze all the relevant data, prepare tables and charts, and write up the results in clear, concise language.

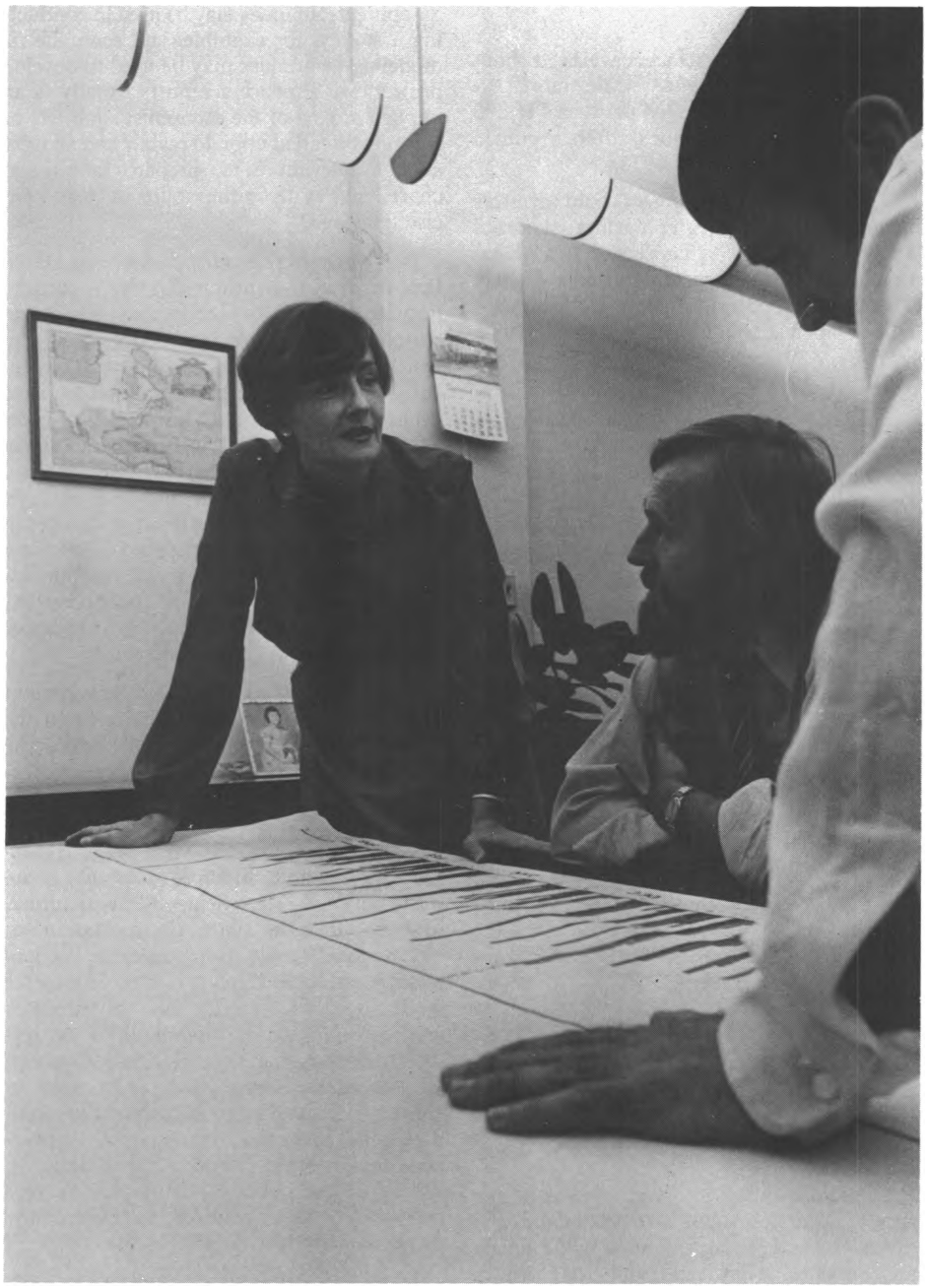
Being able to present economic and statistical concepts in a meaningful way is particularly important for economists whose research is policy directed. Economists who work for business firms may be asked to provide management with information to make decisions on marketing and pricing of company products; to look at the advisability of adding new lines of merchandise, opening new branches, or diversifying the company's operations; to analyze the effect of changes in the tax laws; or to prepare economic and business forecasts. Business economists working for firms that carry on operations abroad may be asked to prepare forecasts of foreign economic conditions.

Economists who work for government agencies assess economic conditions in the United States and abroad and predict the economic impact of specific changes in legislation or public policy. They study such questions as the effect on youth unemployment of changes in minimum wage legislation, for example. Most government economists are in the fields of agriculture, business, finance, labor, transportation, or international trade. For example, economists in the U.S. Department of Commerce study domestic production, distribution, and consumption of commodities or services; those in the Federal Trade Commission prepare industry analyses to assist in enforcing Federal statutes designed to eliminate unfair, deceptive, or monopolistic practices in interstate commerce; and those in the Bureau of Labor Statistics plan surveys and analyze data on prices, wages, employment, and productivity.

Economists in colleges and universities teach the theories, principles, and methods of economics. In addition, economics faculty members conduct research, write, and engage in other nonteaching activities. They frequently are asked to serve as consultants to business firms, government agencies, and individuals. (For more information on jobs in colleges and universities, see the *Handbook* statement on college and university faculty.)

Working Conditions

Economists employed by colleges and universities have flexible work schedules, dividing their time among teaching, research, and administrative responsibilities. Economists working for government agencies and private firms, on the other hand, have much more structured work schedules. They often work alone with only books, statistical charts, computers, and calculators for company. Or they may be an integral part of a research team on some assigned projects. Most econo-



Economists examining a chart on business activity in the United States during 1972.

mists work under pressure of deadlines, tight schedules, and heavy workloads, and sometimes must work overtime. Their routine may be interrupted by telephone calls, letters, special requests for data, meetings, or conferences. Travel may be necessary to collect data or attend conferences.

Places of Employment

Economics is the largest social science field. About 130,000 persons worked as economists in 1978. About 3 out of 4 of these jobs are in private industry, including manufacturing firms, banks, insurance companies, securities and investment companies, economic research firms, and management consulting firms. Colleges and universities and government agencies at all levels employ most other economists. Some, however, run their own consulting businesses. A number of economists combine a full-time job in government, business, or an academic institution with part-time or consulting work in another setting.

Economists work in all large cities and university towns. The largest number are in the New York City and the Washington, D.C., metropolitan areas. Some work abroad for companies with major international operations; for the Departments of State, Commerce, Agriculture, and other U.S. Government agencies; and for international organizations.

Training, Other Qualifications, and Advancement

Economists must have a thorough understanding of economic theory and of mathematical methods of economic analysis. Since many beginning jobs for economists in government and business involve the collection and compilation of data, a thorough knowledge of basic statistical procedures is required. In addition to courses in macroeconomics, microeconomics, econometrics, and business and economic statistics, training in computer science is highly recommended.

At the undergraduate level, courses in the following subjects also are valuable: Business cycles; economic and business history; economic development of selected areas; money and banking; international economics; public finance; industrial organization; labor economics; comparative economic systems; economics of national planning; urban economic problems and policies; marketing principles and organization; consumer analysis; organizational behavior; and business law.

A bachelor's degree with a major in economics is sufficient for many beginning research, administrative, management trainee, and business sales jobs. However, graduate training increasingly is required for advancement to more responsible positions as economists. Areas of specialization at the graduate level include advanced economic theory, comparative economic systems and planning, econometrics, economic development, economic history, environmental and natural resource economics, history of economic thought, industrial oganization, institutional economics, international economics, labor economics, monetary economics, public finance, regional and urban economics, and social policy. Students should select graduate schools strong in specialties in which they are interested. Some schools help graduate students find internships or part-time employment in government agencies or economic research firms. The work experience and contacts can be useful in testing career preferences and learning how the job market for economists really works.

In the Federal Government, candidates for entrance positions generally need a college degree with a minimum of 21 semester hours of economics and 3 hours of statistics, accounting, or calculus. However, because competition for Federal jobs is keen, additional education or experience may be required.

A master's degree generally is the minimum requirement for a job as a college instructor in many junior colleges and small 4-year schools. In some colleges and universities, however, a Ph. D. degree is necessary for appointment as a teaching assistant or instructor. The Ph. D. degree is required for a professorship and is necessary to gain tenure, which is becoming increasingly difficult to obtain.

In government, industry, research organizations, and consulting firms, economists who have a graduate degree usually can qualify for more responsible research and administrative positions. A Ph. D. may be necessary for top positions in some organizations. Experienced business economists may advance to managerial or execu-

tive positions in banks, industrial concerns, trade associations, and other organizations where they formulate practical business and administrative policy.

About 1,500 colleges and universities offer bachelor's degree programs in economics; about 260, master's; and about 120, doctoral programs.

Persons who consider careers as economists should be able to work accurately with detail since much time is spent on data analysis. Patience and persistence are necessary because economists may spend long hours on independent study and problem solving. Sociability enables economists to work easily with others. Economists must be objective and systematic in their work and must be able to express themselves effectively both orally and in writing. Creativity and intellectual curiosity are essential to success in this field, just as they are in other areas of scientific endeavor.

Employment Outlook

Employment of economists is expected to grow faster than the average for all occupations through the 1980's. However, about as many openings will result from deaths, retirements, and other separations from the labor force as from employment growth.

Business and industry, research organizations, and consulting firms will continue to provide the largest number of employment opportunities for economists, reflecting the complexity of the domestic and international economies and increased reliance on quantitative methods of analyzing business trends, forecasting sales, and planning purchases and production operations. Employers will accordingly seek economists well trained in econometrics and statistics.

The continued need for economic analyses on the part of lawyers, accountants, engineers, health administrators, urban planners, and others will also contribute to an increase in the number of jobs for economists. Employment of economists in State and local government agencies is expected to increase in response to the heavy responsibilities of local authorities in such areas as housing, transportation, environment and natural resources, health, and employment development and training. Employment of economists in the Federal Government is expected to rise slowly—in line with the rate of growth projected for the Federal work force as a whole. Little or no employment growth is expected in colleges and universities, the traditional employer of many highly qualified economists. As a result, many such economists are expected to enter nonacademic positions.

Persons who graduate with a bachelor's degree in economics through the 1980's are likely to face keen competition for jobs as economists. However, many of these degree holders will find employment in government, industry, and business as management or sales trainees, or as research or administrative assistants. Those with strong backgrounds in mathematics, statistics, and computer science may be hired by private firms for marketing research work. Candidates who hold master's degrees in economics face very strong competition for teaching positions in colleges and universities, although some may gain positions in junior and community colleges. However, they should find good opportunities for administrative, research, and planning positions in private industry and government. Those with a strong background in marketing and finance may have the best prospects in business. Ph. D.'s are likely to face competition for academic positions, although those graduating from high-ranking universities may have an advantage. Generalists with a strong background in mathematics and statistics who can teach an applied area are in greatest demand. Ph. D.'s should have favorable opportunities in government, industry, research organizations, and consulting firms.

Generally, a strong background in economic theory and econometrics provides the tools for acquiring any specialty within the field. Those skilled in quantitative techniques and their application to economic modeling and forecasting are likely to have the best job opportunities.

Earnings

According to the 1977-78 College Placement Council Salary Survey, bachelor's degree candidates in economics received offers averaging around $12,200 a year; master's degree candidates in the social sciences, around $13,200; bachelor's degree candidates offered positions in the field of finance and economics, around $12,100.

According to an American Economic Association survey, average salaries of economists employed in college and university departments that offered the Ph. D. degree for the academic year 1977-78 were as follows: For professors, about $29,500; for associate professors, about $21,500; for assistant professors, about $17,100; and for instructors, about $13,300. Average salaries were lower in departments that offered only the master's or bachelor's degree.

The median base salary of business economists in 1978 was $33,000, according to a National Association of Business Economists survey. About one-half of the respondents reported additional compensation from their primary employment while about one-third reported income from secondary employment. Economists in general administration and economic advisors commanded the highest salaries while statisticians, econometricians, and teachers had the lowest base salaries. By industry, the highest paid business economists were in the securities and investment, mining, or consulting fields.

Those with a Ph. D. reported the highest salaries while there was relatively little salary difference between master's and bachelor's degree holders. A substantial number of economists supplement their salaries by consulting, teaching, and research activities.

The Federal Government recognizes education and experience in certifying applicants for entry level positions. In general, the entrance salary for economists having a bachelor's degree was was $10,507 a year in 1979; however, those with superior academic records could begin at $13,014. Those having a master's degree could qualify for positions at an annual salary of $15,920, while those with a Ph. D. could begin at $19,263. Economists in the Federal Government averaged around $27,700 in 1978. Economists work in many government agencies, primarily in the Departments of State; Treasury; Army; Interior; Agriculture; Commerce; Labor; Health, Education, and Welfare; Housing and Urban Development; and Transportation.

Based on a 1978 State government salary survey, average salaries for economists (positions requiring a bachelor's degree) ranged from about $12,200 to $16,200; for principal economists (positions requiring a master's degree and experience), from $17,000 to $22,700; and for chiefs of economic research (positions requiring a master's degree and extensive administrative or supervisory experience), from $21,600 to $28,200.

Related Occupations

Economists are concerned with understanding and interpreting financial matters. Others with jobs in this area include financial analysts, bank officers, accountants, underwriters, actuaries, securities sales workers, appraisers, credit analysts, loan officers, and budget officers.

Sources of Additional Information

For information on job openings for economists with graduate degrees and on schools offering graduate training in economics, contact:

American Economic Association, 1313 21st Avenue South, Nashville, Tenn. 37212.

For additional information on careers in business economics, contact:

National Association of Business Economists, 28349 Chagrin Blvd., Suite 201, Cleveland, Ohio 44122.

Engineering and Science Technicians

Nature of the Work

Knowledge of science, mathematics, industrial machinery, and technical processes enables engineering and science technicians to work in all phases of business and government, from research and design to manufacturing, sales, and customer service. Although their jobs are more limited in scope and more practically oriented than those of engineers or scientists, technicians often apply the theoretical knowledge developed by engineers

and scientists to actual situations. Technicians frequently use complex electronic and mechanical instruments, experimental laboratory equipment, and drafting instruments. Almost all technicians described in this statement must be able to use technical handbooks and calculators, and some must work with computers.

In research and development, one of the largest areas of employment, technicians set up experiments and calculate the results, sometimes with the aid of computers. They also assist engineers and scientists in developing experimental equipment and models by making drawings and sketches and, frequently, by doing routine design work.

In production, technicians usually follow the plans and general directions of engineers and scientists, but often without close supervision. They may prepare specifications for materials, devise tests to insure product quality, or study ways to improve the efficiency of an operation. They often supervise production workers to make sure they follow prescribed plans and procedures. As a product is built, technicians check to see that specifications are followed, keep engineers and scientists informed on progress, and investigate production problems.

As sales workers or field representatives for manufacturers, technicians give advice on installation and maintenance of complex machinery, and may write specifications and technical manuals. (See statement on technical writers elsewhere in the *Handbook*.)

Technicians may work in engineering, physical science, or life science. Within these general fields, job titles may describe the level (biological aide or biological technician), duties (quality control technician or time study analyst), or area of work (mechanical, electrical, or chemical).

An engineering technician might work in any of the following areas:

Aeronautical Technology. Technicians in this area work with engineers and scientists to design and produce aircraft, rockets, guided missiles, and spacecraft. Many aid engineers in preparing design layouts and models of structures, control systems, or equipment installations by collecting information, making computations, and performing laboratory tests. For example, a technician might estimate weight factors, centers of gravity, and other items affecting load capacity of an airplane or missile. Other technicians prepare or check drawings for technical accuracy, practicability, and economy.

Aeronautical technicians frequently work as manufacturers' field service representatives, serving as the link between their company and the military services, commerical airlines, and other customers. Technicians also prepare technical information for instruction manuals, bulletins, catalogs, and other literature. (See statements on aerospace engineers, airplane mechanics, and occupations in aircraft, missile, and spacecraft manufacturing elsewhere in the *Handbook*.)

Air-Conditioning, Heating, and Refrigeration Technology. Air-conditioning, heating, and refrigeration technicians design, manufacture, sell, and service equipment to regulate interior temperatures. Technicians in this field often specialize in one area, such as refrigeration, and sometimes in a particular type of activity, such as research and development.

When working for firms that manufacture temperature-controlling equipment, technicians generally work in research and engineering departments, where they assist engineers and scientists in the design and testing of new equipment or production methods. For example, a technician may construct an experimental model to test its durability and operating characteristics. Technicians also work as sales workers for equipment manufacturers or dealers, and must be able to supply engineering firms and other contractors that design and install systems with information on installation, maintenance, operating costs, and the performance specifications of the equipment. Other technicians work for contractors, where they help design and prepare installation instructions for air-conditioning, heating, or refrigeration systems. Still others, in customer service, are responsible for supervising the installation and maintenance of equipment. (See statement on refrigeration and air-conditioning mechanics elswhere in the *Handbook*.)

Civil Engineering Technology. Technicians in this area assist civil engineers in planning, designing, and constructing highways, bridges, dams, and other structures. They often specialize in one area, such as highway or structural technology. During the planning stage, they estimate cost, prepare specifications for materials, or participate in surveying, drafting, or designing. Once construction begins, they assist the contractor or superintendent in scheduling construction activities or inspecting the work to assure conformance to blueprints and specifications. (See statements on civil engineers, drafters, and surveyors elsewhere in the *Handbook*.)

Electronics Technology. Technicians in this field develop, manufacture, and service electronic equipment and systems. The types of equipment range from radio, radar, sonar, and television to industrial and medical measuring or control devices, navigational equipment, and computers. Because the field is so broad, technicans often specialize in one area, such as automatic control devices or electronic amplifiers. Furthermore, technological advancement is constantly opening up new areas of work such as integrated circuit technology.

When working in design, production, or customer service, electronic technicians use sophisticated measuring and diagnostic devices to test, adjust, and repair equipment. In many cases, they must understand the field in which the electronic device is being used. To design equipment for space exploration, for example, they must consider the need for minimum weight and volume and maximum resistance to shock, extreme temperature, and pressure. Some electronics technicians also work in technical sales, while others work in the radio and television broadcasting industry. (See statements on broadcast technicians and occupations in radio and television broadcasting elsewhere in the *Handbook*.)

Industrial Production Technology. Technicians in this area, usually called industrial or production technicians, assist industrial engineers on problems involving the efficient use of personnel, materials, and machines to produce goods and services. They prepare layouts of machinery and equipment, plan the flow of work, make statistical studies, and analyze production costs. Industrial technicians also conduct time and motion studies (analyze the time and movements a worker needs to accomplish a task) to improve the production methods and procedures in manufacturing plants.

Many industrial technicians acquire experience that enables them to qualify for other jobs. For example, those specializing in machinery and production methods may move into industrial safety. Others, in job analysis, may set job standards and interview, test, hire, and train personnel. Still others may move into production supervision. (See statements on personnel workers and industrial engineers elsewhere in the *Handbook*.)

Mechanical Technology. Mechanical technology is a broad term that covers a large number of specialized fields including automotive, diesel, and production technology and tool and machine design.

Technicians assist engineers in design and development work by making freehand sketches and rough layouts of proposed machinery and other equipment and parts. This work requires knowledge of mechanical principles involving tolerance, stress, strain, friction, and vibration factors. Technicians also analyze the costs and practical value of designs.

In planning and testing experimental machines and equipment for performance, durability, and efficiency, technicians record data, make computations, plot graphs, analyze results, and write reports. They sometimes recommend design changes to improve performance. Their job often requires skill in the use of complex instruments, test equipment, and gauges, as well as in the preparation and interpretation of drawings.

When a product is ready for production, technicians help prepare layouts and drawings of the assembly process and of parts to be manufactured. They frequently help estimate labor costs, equipment life, and plant space. Some mechanical technicians test and inspect machines and equipment in manufacturing departments or work with engineers to eliminate production problems. Others are technical sales workers.

Tool designers are among the better

An electronics technician works on solid-state components in the production of TV parts.

known specialists in mechanical engineering technology. Tool designers prepare sketches of designs for cutting tools, jigs, dies, special fixtures, and other devices used in mass production. Frequently, they redesign existing tools to improve their efficiency. They also make, or supervise others who make detailed drawings of tools and fixtures.

Machine drafting with some designing, another major area often grouped under mechanical technology, is described in the statement on drafters. (Also see statements on mechanical engineers, automobile mechanics, and manufacturers' sales workers elsewhere in the *Handbook*.)

Instrumentation Technology. Automated manufacturing and industrial processes, oceanographic and space exploration, weather forecasting, satellite communication systems, environmental protection, and medical research have helped to make instrumentation technology a fast-growing field. Technicians help develop and design complex measuring and control devices such as those in a spacecraft that sense and measure changes in heat or pressure, automatically record data, and make necessary adjustments. These technicians have extensive knowledge of physical sciences as well as electrical-electronic and mechanical engineering.

Several areas of opportunity exist in the physical sciences: *Chemical technicians* work with chemists and chemical engineers to develop, sell, and utilize chemical and related products and equipment.

Most chemical technicians do research and development, testing, or other laboratory work. They often set up and conduct tests on processes and products being developed or improved. For example, a technician may examine steel for carbon, phosphorus, and sulfur content or test a lubricating oil by subjecting it to changing temperatures. The technician measures reactions, analyzes the results of experiments, and records data that will be the basis for decisions and future research.

Chemical technicians in production generally put into commerical operation those products or processes developed in research laboratories. They assist in making the final design, installing equipment, and training and supervising operators on the production line. Technicians in quality control test materials, production processes, and final products to insure that they meet the manufacturer's specifications and quality standards. Many also sell chemicals or chemical products as technical sales personnel.

Many chemical technicians use computers and instruments, such as a dilatometer (which measures the expansion of a substance.) Because the field of chemistry is so broad, chemical technicians frequently specialize in a particular industry, such as food processing or pharmaceuticals. (See statements on chemists, chemical engineers, and occupations in the industrial chemical industry elsewhere in the *Handbook*.)

Meteorological technicians support meteorologists in the study of atmospheric conditions. Technicians calibrate instruments, observe, record, and report meteorological occurrences, and assist in research projects and the development of scientific instruments.

Geological technicians assist geologists in evaluating earth processes. Currently much research is being conducted in seismology, petroleum and mineral exploration, and ecology. These technicians install and record measurements from seismographic instruments, assist in field evaluations of earthquake damage and surface displacement, or assist geologists in earthquake prediction research. In petroleum and mineral exploration, they help conduct tests and record sound wave data to determine the likelihood of successful drilling, or use radiation detection instruments and collect core samples to help geologists evaluate the economic possibilities of mining a given resource.

Hydrologic technicians gather data to help hydrologists predict river stages and water quality levels. They monitor instruments that measure water flow, water table levels, or water quality, and record and analyze the data obtained. (See statement on environmental scientists elsewhere in the *Handbook*.)

Technicians in the life sciences generally are classified in either of two broad categories:

Agricultural technicians work with agricultural scientists in food production and processing. Plant technicians conduct tests and experiments to improve the yield and quality of crops, or to increase resistance to disease, insects, or other hazards. Technicians in soil science analyze the chemical and physical properties of various soils to help determine the best uses for these soils. Animal husbandry technicians work mainly with the breeding and nutrition of animals. Other agricultural technicians are employed in the food industry as food processing technicians. In quality control or in food science research they help scientists develop better and more efficient ways of processing food material for human consumption. (See statement on food technologists elsewhere in the *Handbook*.)

Biological technicians work primarily in laboratories where they perform tests and experiments under controlled conditions. Microbiological technicians study microscopic organisms and may be involved in immunology or parasitology research. Laboratory animal technicians study and report on the reaction of laboratory animals to certain physical and chemical stimuli. They also study and conduct research to help biologists develop cures for human diseases. By conducting experiments and reporting the results to a biochemist, technicians assist in analyzing biological substances (blood, other body fluids, foods, and drugs). A biological technician also might work with insects to study insect control, develop new insecticides, or determine how to use insects to control other insects or undesirable plants. (See statements on life scientists elsewhere in the *Handbook*.)

Technicians also specialize in fields such as metallurgical (metal), electrical, and optical technology. In the atomic energy field, technicians work with scientists and engineers on problems of radiation safety, inspection, and decontamination. (See statement on occupations in the atomic energy field elswhere in the *Handbook*.) New areas of work include environmental protection, where technicians

study the problems of air and water pollution, and industrial safety.

Working Conditions

Technicians work under a wide variety of conditions. Most work regular hours in laboratories and industrial plants. Others work part or all of their time outdoors. Some occasionally are exposed to safety or health hazards from equipment or materials.

Places of Employment

Over 600,000 persons worked as engineering and science technicians in 1978. About two-thirds of all technicians worked in private industry. In the manufacturing sector, the largest employers were the electrical equipment, chemical, machinery, and aerospace industries. In nonmanufacturing, large numbers worked in wholesale and retail trade, communications, and in engineering and architectural firms.

In 1978, the Federal Government employed about 90,000 technicians, chiefly as engineering and electronics technicians, biological technicians, cartographic (mapmaking) technicians, meteorological technicians, and physical science technicians. The largest number worked for the Department of Defense; most of the others worked for the Departments of Transportation, Agriculture, Interior, and Commerce.

State government agencies employed nearly 50,000 engineering and science technicians, and local governments about 11,500. The remainder worked for colleges and universities and nonprofit organizations.

Training, Other Qualifications, and Advancement

Although persons can qualify for technician jobs through many combinations of work experience and education, most employers prefer applicants who have had some specialized technical training. Specialized training is available at technical institutes, junior and community colleges, area vocational-technical schools, extension divisions of colleges and universities, and vocational-technical high schools. Some engineering and science students who have not completed the bachelor's degree and others who have degrees in science and mathematics also are able to qualify for technician positions.

Persons also can qualify for technician jobs by less formal methods. Workers may learn through on-the-job training, apprenticeship programs, or correspondence schools. Some qualify on the basis of experience gained in the Armed Forces. However, postsecondary training is becoming increasingly necessary for advancement to more responsible jobs.

Some of the types of postsecondary and other schools that provide technical training are discussed in the following paragraphs:

Technical Institutes. Technical institutes offer training to qualify students for a job immediately after graduation with a minimum of on-the-job training. In general, students receive intensive technical training but less theory and general education than in engineering schools or liberal arts colleges. A few technical institutes and community colleges offer cooperative programs in which students spend part of the time in school and part in paid employment related to their studies.

Some technical institutes operate as regular or extension divisions of colleges and universities. Other institutions are operated by States and municipalities, or by private organizations.

Junior and Community Colleges. Curriculums in junior and community colleges which prepare students for technician occupations are similar to those in technical institutes but emphasize theory and liberal arts. After completing the 2-year programs, some graduates qualify for technician jobs while others continue their education at 4-year colleges.

Area Vocational-Technical Schools. These postsecondary public institutions serve students from surrounding areas and emphasize training in skills needed by employers in the local area. Most require a high school degree or its equivalent for admission.

Other Training. Some large corporations conduct training programs and operate private schools to meet the needs of technically trained personnel in specific jobs; such training rarely includes general studies. Training for some technician occupations, for instance tool designers and electronic technicians, is available through formal 2- to 4-year apprenticeship programs. The apprentice gets on-the-job training under the close supervision of an experienced technician and related technical knowledge in classes, usually after working hours.

The Armed Forces have trained many technicians, especially in electronics. Although military job requirements generally differ from those in the civilian economy, military technicians often find employment with only minimal additional training.

Many private technical and correspondence schools often specialze in a single field of technical training such as electronics. Some of these schools are owned and operated by large corporations that have the resources to provide up-to-date training in a technical field.

Those interested in a career as a technician should have an aptitude for mathematics and science and enjoy technical work. An ability to do detailed work with a high degree of accuracy is necessary; for design work, creative talent also is desirable. Technicians are part of a scientific team, and often work closely with engineers and scientists as well as other technicians and skilled workers. Some technicans, such as repair and maintenance technicians, should be able to work independently and to deal effectively with customers.

Engineering and science technicians usually begin work as trainees in routine positions under the direct supervision of an experienced technician, scientist, or engineer. As they gain experience, they receive more responsibility and carry out a particular assignment under only general supervision. Technicians may eventually move into supervisory positions. Those who have the ability and obtain additional education occasionally may be promoted to positions as scientists or engineers.

Employment Outlook

Employment opportunities for engineering and science technicians are expected to be favorable through the 1980's. Opportunities will be best for graduates of postsecondary school technician training programs. Besides openings resulting from the slightly faster than average growth expected in this field, additional technicians will be needed to replace those who die, retire, or leave the occupation.

Industrial expansion and the increasing complexity of modern technology underlie the anticipated increase in demand for technicians. Many will be needed to work with the growing number of engineers and scientists in developing, producing, and distributing new and technically advanced products. Automation of industrial processes and continued growth of new areas of work such as environmental protection and energy development will add to the demand for technical personnel.

The anticipated growth of research and development expenditures in industry and government also should increase requirements for technicians.

Earnings

In private industry in 1977, technicians who completed a 2-year post-high school program earned starting salaries of about $10,500 a year, according to a survey by the Engineering Manpower Commission; those who did not complete a 2-year program started at about $9,000 a year. Graduates of 2-year programs with 5 years' experience earned about $12,800 a year in 1977, while nongraduates with some experience earned about $11,100. Senior technicians averaged about $18,700 a year in 1978, according to a Department of Labor survey.

Starting salaries for all technicians in the Federal Government were fairly uniform in 1979. A high school graduate with no experience could expect $8,366 annually to start. With an associate degree, the starting salary was $9,391, and with a bachelor's, $10,507 or $13,014. With more experience, however, earnings are significantly higher. The average annual salary for all engineering technicians employed by the Federal Government in 1978 was $19,617; for physical science tech-

nicians, $15,935; and for life science technicians, about $11,375.

Related Occupations

Engineering and science technicians apply scientific principles in their work. Other occupations whose work activities involve the application of scientific principles include foresters, forestry technicians, range managers, soil conservationists, engineers, environmental, life, and physical scientists, broadcast technicians, drafters, surveyors, television and radio service technicians, dental laboratory technicians, and medical technologists and technicians.

Sources of Additional Information

For information on careers in engineering and technology contact:

Engineers Council for Professional Development, 345 East 47th St., New York, N.Y. 10017.

Information on schools offering technician programs is available from:

National Association of Trade and Technical Schools, 2021 K St. N.W., Washington, D.C. 20006.

State departments of education also have information about approved technical institutes, junior colleges, and other educational institutions within the State offering post-high school training for specific technical occupations. Other sources include:

American Association of Community and Junior Colleges, One Dupont Circle, Suite 410, Washington, D.C. 20036.

National Home Study Council, 1601 18th St. NW., Washington, D.C. 20009.

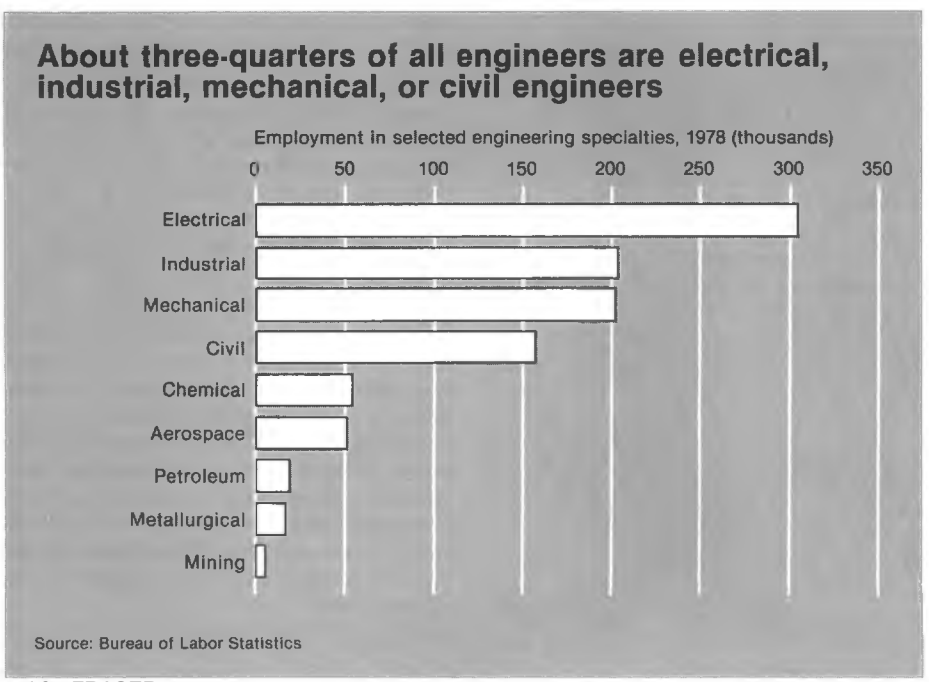
Engineers

The work of engineers affects our lives in thousands of ways. Their accomplishments have enabled us to drive safer automobiles, reach the moon, and prolong life through special machinery. Future accomplishments could help increase energy supplies, develop more pollution-free powerplants, and aid medical science's fight against disease.

In 1978, about 1.1 million persons were employed as engineers. Engineering is the second largest professional occupation, exceeded only by teaching. Most engineers specialize in 1 of the more than 25 specialties recognized by professional societies. Within the major branches are over 85 subdivisions. Structural, environmental, hydraulic, and highway engineering, for example, are subdivisions of civil engineering. Engineers also may specialize in the engineering problems of one industry, such as motor vehicles, or in a particular field of technology, such as propulsion or guidance systems. This section, which contains an overall discussion of engineering, is followed by separate statements on 12 branches of the profession—aerospace, agricultural, biomedical, ceramic, chemical, civil, electrical, industrial, mechanical, metallurgical, mining, and petroleum engineering.

Nature of the Work

Engineers apply the theories and principles of science and mathematics to practical technical problems. The challenge of solving technical problems is a source of satisfaction to many engineers. Often their work is the link between a scientific discovery and its useful application. Engineers design machinery, products, systems, and processes for efficient and economical performance. They develop electric power, water supply, and waste disposal systems to meet the problems of urban living. They design industrial machinery and equipment used to manufacture goods, and heating, air-conditioning, and ventilation equipment for more comfortable living. Engineers also develop scientific equipment to probe outer space and the ocean depths, design defense and weapons systems for the Armed Forces, and design, plan, and supervise the construction of buildings, highways, and rapid transit systems. They design and develop consumer products such as automobiles, television sets, and refrigerators, and systems for control and automation of manufacturing, business, and management processes.



Engineers must consider many factors in developing a new product. For example, in developing new devices to reduce automobile exhaust emissions, engineers must determine the general way the device will work, design and test all components, and fit them together in an integrated plan. They must then evaluate the overall effectiveness of the new device, as well as its cost and reliability. This design process applies to most products, including those as different as medical equipment, electronic computers, and industrial machinery.

In addition to design and development, many engineers work in testing, production, operation, or maintenance. They supervise the operation of production processes, determine the causes of breakdowns, and perform tests on newly manufactured products to ensure that quality standards are maintained. They also estimate the time and the cost needed to complete engineering projects. Still others work in administrative and management jobs where an engineering background is necessary, or in sales jobs where they discuss the technical aspects of a product and assist in planning its installation or use. (See statement on manufacturers' sales workers elsewhere in the *Handbook*.) Engineers with

considerable education or experience sometimes work as consultants. Some with advanced degrees teach in the engineering schools of colleges and universities.

Engineers within each of the branches apply their specialized knowledge to many fields. Electrical engineers, for example, work in the medical, computer, missile guidance, or electric power distribution fields. Because engineering problems are usually complex, the work in some fields cuts across the traditional branches. Using a team approach to solve problems, engineers in one field often work closely with specialists in other scientific, engineering, and business occupations.

Engineers often use calculators or computers to solve mathematical equations that help specify what is needed for a device or structure to function in the most efficient manner. Engineers also spend a great deal of time writing reports of their findings and consulting with other engineers. Because of the complexity of most of the projects on which they are involved, many engineers work with only a small portion of the total project. Some are responsible for an entire project and may supervise other engineers.

Working Conditions

Most engineers spend a great deal of their time in offices; some are at a desk almost all of the time. But some engineers work in research laboratories or in industrial plants. Engineers in specialties such as civil engineering may work outdoors part of the time. Although not typical, some engineers travel extensively to their firm's or client's plants or construction sites. Some may put in considerable overtime to meet deadlines, often without additional compensation.

Places of Employment

Almost half of all engineers work in manufacturing industries—mostly in the electrical and electronic equipment, aircraft and parts, machinery, chemicals, scientific instruments, primary metals, fabricated metal products, and motor vehicle industries. About 400,000 were employed in nonmanufacturing industries in 1978, primarily in construction, public utilities, engineering and architectural services, and business and management consulting services.

Federal, State, and local governments employed about 150,000 engineers. Over half of these worked for the Federal Government, mainly in the Departments of Defense, Interior, Energy, Agriculture, and Transportation, and in the National Aeronautics and Space Administration. Most engineers in State and local government agencies worked in highway and public works departments.

Colleges and universities employed almost 50,000 engineers in research and teaching jobs, and a small number worked for nonprofit research organizations.

Engineers are employed in every State, in small and large cities, and in rural areas. Some branches of engineering are concentrated in particular industries and geographic areas, as discussed in the statements later in this chapter.

Training, Other Qualifications, and Advancement

A bachelor's degree in engineering is the generally accepted educational requirement for beginning engineering jobs. College graduates trained in one of the natural sciences or mathematics also may qualify for some beginning jobs. Experienced technicians with some engineering education are occasionally able to advance to some types of engineering jobs.

Many colleges have 2- or 4-year programs leading to degrees in engineering technology. These programs prepare students for practical design and production work rather than for jobs that require more theoretical scientific and mathematical knowledge. Graduates of 4-year engineering technology programs may get jobs similar to those obtained by engineering bachelor's degree graduates. However, some employers regard them as having skills somewhere between those of a technician and an engineer.

Graduate training is essential for most beginning teaching and research positions but is not needed for the majority of other entry level engineering jobs. Many engineers obtain master's degrees, however, because an advanced degree often is desirable for promotion or is needed to keep up with new technology. Some specialties, such as nuclear or biomedical engineering, are taught mainly at the graduate level.

About 240 colleges and universities offer a bachelor's degree in engineering, and almost 70 colleges offer a bachelor's degree in engineering technology. Although programs in the larger branches of engineering are offered in most of these institutions, some small specialties are taught in only a very few. Therefore, students desiring specialized training should investigate curriculums before selecting a college. Admissions requirements for undergraduate engineering schools usually include high school courses in advanced mathematics and the physical sciences.

In a typical 4-year curriculum, the first 2 years are spent studying basic sciences—mathematics, physics, chemistry, and introductory engineering—and the humanities, social sciences, and English. The last 2 years are devoted, for the most part, to specialized engineering courses. Some programs offer a general engineering curriculum, permitting the student to choose a specialty in graduate school or acquire it on the job.

Some engineering curriculums require more than 4 years to complete. A number of colleges and universities now offer 5-year master's degree programs. In addition, several engineering schools have formal arrangements with liberal arts colleges whereby a student spends 3 years in a liberal arts college studying preengineering subjects and 2 years in an engineering school and receives a bachelor's degree from each.

Some schools have 5- or even 6-year cooperative plans where students coordinate classroom study and practical work experience. In addition to gaining useful experience, students can thereby finance part of their education. Because of the need to keep up with rapid advances in technology, engineers often continue their education throughout their careers.

All 50 States and the District of Columbia require licensing for engineers whose work may affect life, health, or property, or who offer their services to the public. In 1978, there were over 300,000 registered engineers. Generally, registration requirements include a degree from an accredited engineering school, 4 years of relevant work experience, and the passing of a State examination.

Engineering graduates usually begin work under the supervision of experienced engineers. Some companies have programs to acquaint new engineers with special industrial practices and to determine the specialties for which they are best suited. Experienced engineers may advance to positions of greater responsibility, and some move to management or administrative positions after several years of engineering. Some engineers obtain graduate degrees in business administration to improve their advancement opportunities, while still others obtain law degrees and become patent attorneys. Many high level executives in private industry began their careers as engineers.

Engineers should be able to work as part of a team and should have creativity, an analytical mind, and a capacity for detail. In addition to technical skills, it is important that engineers be able to express themselves well—both orally and in writing.

Employment Outlook

Employment opportunities for those with degrees in engineering are expected to be good through the 1980's. In addition there may be some opportunities for college graduates from related fields in certain engineering jobs.

Employment of engineers is expected to increase slightly faster than the average for all occupations through the 1980's. In additon to job openings created by growth, many openings are expected to result from the need to replace engineers who will die, retire, or transfer to management, sales, and other professional jobs.

Much of the expected growth in requirements of engineers will stem from industrial expansion to meet the demand for more goods and services. More engineers will be needed in the design and construction of factories, utility systems, office buildings, and transportation systems, as well as in the development and manufacture of defense-related products, scientific instruments, industrial machinery, chemical products, and motor vehicles.

Engineers will be required in energy-related activities developing sources of en-

Table 1. Average starting salaries for engineers by branch, 1978

Branch	Salary
Petroleum engineering	$19,836
Chemical engineering	18,156
Mining engineering	17,964
Metallurgical engineering	17,016
Mechanical engineering	16,848
Electrical engineering	16,404
Industrial engineering	16,380
Aeronautical engineering	16,248
Civil engineering	15,456

SOURCE: College Placement Council.

ergy as well as designing energy-saving systems for automobiles, homes, and other buildings. Engineers also will be needed to solve environmental problems.

Since the number of degrees expected to be granted in engineering in the 1980's is substantially higher than the number granted recently, some graduates may experience competition for engineering employment if the economy enters a recession or if research and development expenditures do not increase as expected. Further, if the demand for their specialty declines, engineers may lose their jobs. This can be a particular problem for older engineers, who may face difficulties in finding other engineering jobs. These difficulties can be minimized by selection of a career in one of the more stable industries and engineering specialties, and by continuing education to keep up on the latest technological developments.

Despite these problems, over the long run the number of people seeking jobs as engineers is expected to be in balance with the number of job openings.

(The outlook for various branches is discussed in the separate statements later in this section.)

Earnings

According to the College Placement Council, engineering graduates with a bachelor's degree and no experience were offered average starting salaries of $16,800 a year in private industry in 1978; those with a master's degree and no experience, $18,700 a year; and those with a Ph. D., over $24,000. Starting offers for those with the bachelor's degree vary by branch as shown in the accompanying table.

In the Federal Government in early 1979, engineers with a bachelor's degree and no experience could start at $13,657 or $16,920 a year, depending on their college records. Those with a master's degree could start at $18,044, and those having a Ph. D. degree could begin at $19,263. Mining and petroleum engineers could begin at higher salaries, and certain other specialties in some geographic areas also were offered higher salaries. The average salary for experienced engineers in the Federal Government was about $27,700 in 1979.

For a 9-month academic college year in 1978, faculty members with 5 years' experience beyond the bachelor's degree received about $15,150; those with 18 to 20 years experience beyond the bachelor's degree received about $21,150. (See statement on college and university faculty elsewhere in the *Handbook*.)

According to an Engineering Manpower Commission survey, the average salary for engineers with 20 years of experience was $30,500 in 1978. Some in management positions had much higher earnings.

Related Occupations

Engineering is the largest scientific and technical occupation. Other occupations whose work involves related areas of science or technology include environmental scientists, life scientists, physical scientists, mathematicians, engineering and science technicians, and architects.

Sources of Additional Information

General information on engineering careers—including engineering school requirements, courses of study, and salaries—is available from:

Aerospace engineers testing spacecraft components.

Engineers' Council for Professional Development, 345 E. 47th St., New York, N.Y. 10017.

Engineering Manpower Commission of Engineers Joint Council, 345 E. 47th St., New York, N.Y. 10017.

National Society of Professional Engineers, 2029 K St. NW., Washington, D.C. 20006.

Society of Women Engineers, 345 E. 47th St., New York, N.Y. 10017.

Societies representing the individual branches of the engineering profession are listed later in this chapter. Each can provide information about careers in the particular branch.

Aerospace Engineers

(D.O.T. 002.061 except -030, and 002.167)

Nature of the Work

Aerospace engineers design, develop, test, and help produce commercial and military aircraft, missiles, and spacecraft. They play an important role in advancing the state of technology in commercial aviation, defense systems, and space exploration.

Aerospace engineers often specialize in an area of work like structural design, navigational guidance and control, instrumentation and communication, or production methods. They also may specialize in one type of aerospace product, such as passenger planes, helicopters, satellites, or rockets.

Places of Employment

About 60,000 aerospace engineers were employed in 1978, mainly in the aircraft and parts industry. Some worked for Federal Government agencies, primarily the National Aeronautics and Space Administration and the Department of Defense. A few worked for commercial airlines, consulting firms, and colleges and universities.

Employment Outlook

Employment of aerospace engineers, which is largely determined by the level of Federal expenditures on defense and space programs, is expected to grow about as fast as the average for all occupations through the 1980's. Expenditures for the space program are expected to increase only slightly between 1978 and 1990, while defense spending will probably increase moderately. In addition to the jobs that will be created by employment growth, many workers will be required to fill openings created by deaths, retirements, and transfers of workers to other occupations. (See introductory section of this chapter for discussion of training requirements and earnings. See also statement on aircraft, missile, and spacecraft manufacturing elsewhere in the *Handbook*.)

Sources of Additional Information

American Institute of Aeronautics and Astronautics, Inc., 1290 Avenue of the Americas, New York, N.Y. 10019.

Agricultural engineer explaining how to evaluate a machine's performance.

Agricultural Engineers

(D.O.T. 013.061)

Nature of the Work

Agricultural engineers design agricultural machinery and equipment and develop methods that will improve the production, processing, and distribution of food and other agricultural products. They also are concerned with the conservation and management of energy, soil, and water resources. Agricultural engineers work in research and development, production, sales, or management.

Places of Employment

Most of the 14,000 agricultural engineers employed in 1978 worked for manufacturers of farm equipment, electric utility companies, and distributors of farm equipment and supplies. Some worked as engineering consultants who supply services to farmers and farm-related industries; others were specialists with agricultural organizations, or managers of agricultural processing plants.

About 450 agricultural engineers were employed in the Federal Government in 1978, mostly in the Department of Agriculture; some were on the faculty of colleges and universities; and a few worked in State and local governments.

Employment Outlook

Employment of agricultural engineers is expected to grow faster than the average for all occupations through the 1980's. Increasing demand for agricultural products, modernization of farm operations, increasing emphasis on conservation of resources, and the use of agricultural products and wastes as industrial raw materials and energy sources should provide additional opportunities for engineers. (See introductory part of this section for information on training requirements and earnings. See also statement on agriculture elsewhere in the *Handbook*.)

Sources of Additional Information

American Society of Agricultural Engineers, 2950 Niles Rd., St. Joseph, Mich. 49085.

Biomedical Engineers

(D.O.T. 019.061-010)

Nature of the Work

Biomedical engineers use engineering principles to solve medical and health-related

Some biomedical engineers design and develop medical instruments.

problems. Many do research, along with life scientists, chemists, and members of the medical profession, on the engineering aspects of the biological systems of man and animals. Some design and develop medical instruments and devices, including artificial hearts and kidneys, lasers for surgery, and pacemakers that regulate the heartbeat. Other biomedical engineers adapt computers to medical science and design and build systems to modernize laboratory, hospital, and clinical procedures. Most engineers in this field require a sound background in one of the major engineering disciplines (mechanical, electrical, industrial, or chemical) in addition to specialized biomedical training.

Places of Employment

There were about 4,000 biomedical engineers in 1978. Many teach and do research in colleges and universities. Some work for the Federal Government, primarily in the National Aeronautics and Space Administration, or in State agencies. An increasing number work in private industry or in hospitals developing new devices, techniques, and systems for improving health care. Some work in sales positions.

Employment Outlook

Employment of biomedical engineers is expected to grow faster than the average for all occupations through the 1980's, but the actual number of openings in this small profession is not likely to be very large. Those who have advanced degrees will be in demand to teach and to fill jobs resulting from increased expenditures for medical research. Increased research funds could also create new positions in instrumentation and systems for the delivery of health services. (See introductory part of this chapter for information on training requirements and earnings.)

Sources of Additional Information

Alliance for Engineering in Medicine and Biology, Suite 404, 4405 East-West Highway, Bethesda, Md. 20014.

Biomedical Engineering Society, P.O. Box 2399, Culver City, Calif. 90230.

Ceramic Engineers

(D.O.T. 006.061)

Nature of the Work

Ceramic engineers develop new ceramic materials and methods for making ceramic materials into useful products. Although to some, the word ceramics means pottery, ceramics actually include all nonmetallic, inorganic materials which require the use of high temperature in their processing. Thus, ceramic engineers work on products as diverse as glassware, heat-resistant materials for furnaces, electronic components, and nuclear reactors. They also design the equipment to manufacture these products.

Ceramic engineers often specialize in one type of ceramic product—for example, products of refractories (fire- and heat-resistant materials such as firebrick); whitewares (porcelain and china dinnerware or high voltage electrical insulators); structural materials (such as bricks and tile); electronic ceramics (the materials used in the integrated circuits that have made small calculators and computers possible); protective and refractory coatings for metals; glass; abrasives; cement technology; or fuel elements for atomic energy.

Places of Employment

About 14,000 ceramic engineers were employed in 1978, mostly in the stone, clay, and glass industry. Others work in industries that produce or use ceramic products, such as the iron and steel, electrical equipment, aerospace, and chemicals industries. Some are in colleges and universities, independent research organizations, and the Federal Government.

Ceramic engineers often specialize in one area of ceramics, such as glass or ceramics used in electronic components.

Employment Outlook

Employment of ceramic engineers is expected to grow faster than the average for all occupations through the 1980's. Programs related to nuclear energy, electronics, defense, and medical science will provide job opportunities for ceramic engineers. Additional ceramic engineers will be required to improve and adapt traditional ceramic products, such as whitewares and abrasives, to new uses. The development of filters and catalytic surfaces to reduce pollution, and the development of ceramic materials for energy conversion and conservation, should create additional openings. (See introductory part of this section for information on training requirements and earnings.)

Sources of Additional Information

American Ceramic Society, 65 Ceramic Dr., Columbus, Ohio 43214.

Chemical Engineers

(D.O.T. 008.061 and .167-010)

Nature of the Work

Chemical engineers are involved in many phases of the production of chemicals and chemical products. They design equipment and chemical plants as well as determine methods of manufacturing the product. Often, they design and operate pilot plants to test their work and develop chemical processes such as those to remove chemical contaminants from waste materials. Because the duties of chemical engineers cut across many fields, these professionals must have a knowledge of chemistry, physics, and mechanical and electrical engineering.

This branch of engineering is so diversified and complex that chemical engineers frequently specialize in a particular operation such as oxidation or polymerization. Others specialize in a particular area such as pollution control or the production of a specific product like plastics or rubber.

Places of Employment

Most of the 50,000 chemical engineers working in 1978 were in manufacturing industries, primarily those producing chemicals, petroleum, and related products. Some worked in government agencies or taught and did research in colleges and universities. A small number worked for independent research institutes and engineering consulting firms, or as independent consultants.

Employment Outlook

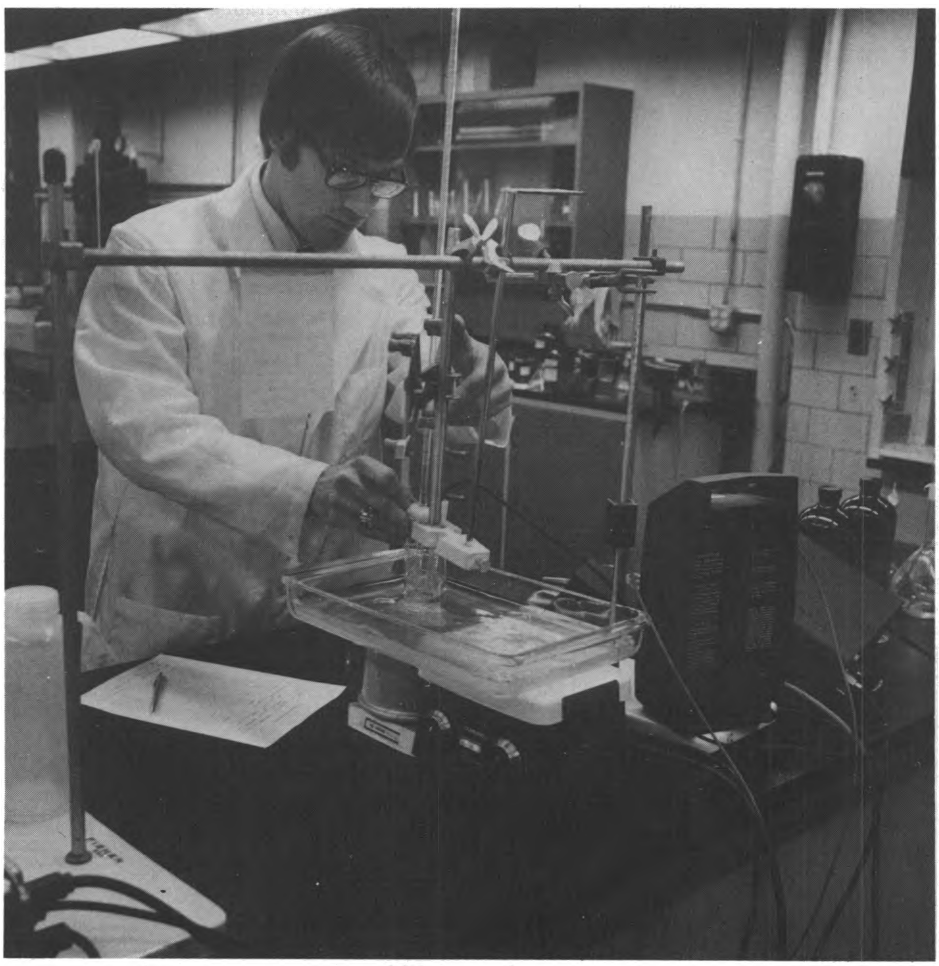
Employment of chemical engineers is expected to grow about as fast as the average for all occupations through the 1980's. A major factor underlying this growth is industry expansion—the chemicals industry in particular.

The growing complexity and automation of chemical processes will require additional chemical engineers to design, build, and maintain the necessary plants and equipment. Chemical engineers also will be needed to solve problems dealing with environmental protection, development of synthetic fuels, and the design and development of nuclear reactors. In addition, development of new chemicals used in the manufacture of consumer goods, such as plastics and synthetic fibers, probably will create additional openings. (See introductory part of this section for information on training requirements and earnings. See also the statement on chemists and the industrial chemical industry elsewhere in the *Handbook*.)

Sources of Additional Information

American Institute of Chemical Engineers, 345 East 47th St., New York, N.Y. 10017.

American Chemical Society, 1155 16th St. NW., Washington, D.C. 20036.



Chemical engineer doing research on a new production process.

Civil Engineers

(D.O.T. 005.061 and .167)

Nature of the Work

Civil engineers, who work in the oldest branch of the engineering profession, design and supervise the construction of roads, harbors, airports, tunnels, bridges, water supply and sewage systems, and buildings. Major specialties within civil engineering are structural, hydraulic, environmental (sanitary), transportation (including highways and railways), urban planning, and soil mechanics.

Many civil engineers are in supervisory or administrative positions ranging from supervisor of a construction site to city engineer to top-level executive. Others teach in colleges and universities or work as consultants.

Places of Employment

About 155,000 civil engineers were employed in 1978. Most work for Federal, State, and local government agencies or in the construction industry. Many work for consulting engineering and architectural firms or as independent consulting engineers. Others work for public utilities, railroads, educational institutions, and manufacturing industries.

Civil engineers work in all parts of the country, usually in or near major industrial and commercial centers. They often work at construction sites, sometimes in remote areas or in foreign countries. In some jobs, they must often move from place to place to work on different projects.

Civil engineer inspect construction projects to insure that plans are followed.

Employment Outlook

Employment of civil engineers is expected to increase about as fast as the average for all occupations through the 1980's. Job opportunities will result from the growing needs for housing, industrial buildings, electric power generating plants, and transportation systems created by a growing population and an expanding economy. Work related to solving problems of environmental pollution and energy self-sufficiency will also require additional civil engineers.

Many civil engineers also will be needed each year to replace those who retire, die, or transfer to other occupations. (See introductory part of this section for information on training requirements and earnings.)

Sources of Additional Information

American Society of Civil Engineers, 345 E. 47th St., New York, N.Y. 10017.

Electrical Engineers

(D.O.T. 003.061, .167, and .187)

Nature of the Work

Electrical engineers design, develop, test, and supervise the manufacture of electrical and electronic equipment. Electrical engineers who work with electronic equipment often are called electronic engineers. Electrical equipment includes power generating and transmission equipment used by electric utilities, electric motors, machinery controls, and lighting and wiring in buildings, automobiles, and aircraft. Electronic equipment includes radar, computers, communications equipment, and consumer goods such as television and stereo sets. Electrical engineers also design and operate facilities for generating and distributing electric power.

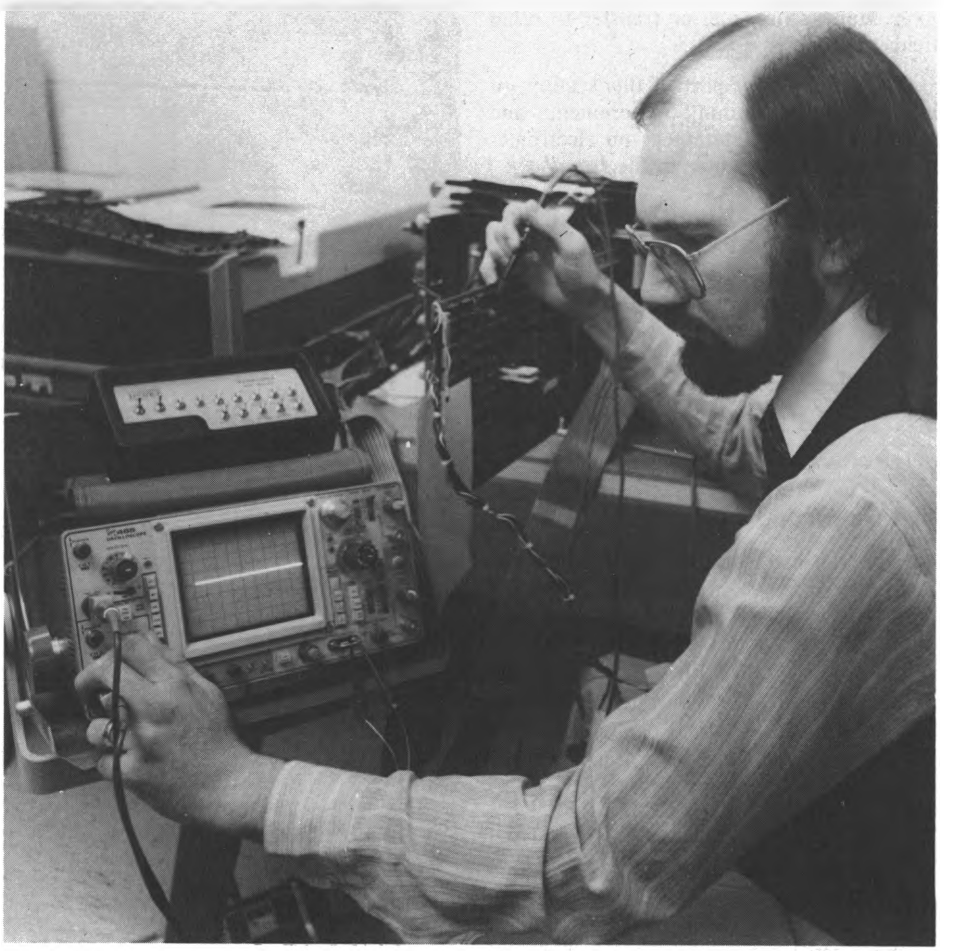
Electrical engineers generally specialize in a major area—such as integrated circuits, computers, electrical equipment manufacturing, communications, or power distributing equipment—or in a subdivision of these areas—microwave communication or aviation electronic systems, for example. Electrical engineers design new products, specify their uses, and write performance requirements and maintenance schedules. They also test equipment, solve operating problems, and estimate the time and cost of engineering projects. Besides employment in research, development, and design, many are in manufacturing, administration and management, technical sales, or teaching.

Places of Employment

Electrical engineering is the largest branch of the profession. About 300,000 electrical engineers were employed in 1978, mainly by manufacturers of electrical and electronic equipment, aircraft and parts, business machines, and professional and scientific equipment. Many work for telephone, telegraph, and electric light and power companies. Large numbers are employed by government agencies and by colleges and universites. Others work for construction firms, for engineering consultants, or as independent consulting engineers.

Employment Outlook

Employment of electrical engineers is expected to increase about as fast as the average for all occupations through the 1980's. Al-



Electrical engineer using an oscilloscope to test electronic circuits in computer equipment.

Industrial engineers developing a data processing system.

though increased demand for computers, communications, and military electronics is expected to be the major contributor to this growth, demand for electrical and electronic consumer goods, along with increased research and development in new types of power generation, should create additional jobs. Many retire, die, or transfer to other fields of work.

(See introductory part of this section for information on training requirements and earnings. See also statement on electronics manufacturing elsewhere in the *Handbook*.)

Sources of Additional Information

Institute of Electrical and Electronics Engineers/ United States Activities Board, 1111 19th St. NW., Washington, D.C. 20036.

Industrial Engineers

(D.O.T. 012.061, .067-010, .167 except -066, and .187)

Nature of the Work

Industrial engineers determine the most effective ways for an organization to use the basic factors of production—people, machines, and materials. They are more concerned with people and methods of business organization than are engineers in other specialties, who generally are concerned more with particular products or processes, such as metals, power, or mechanics.

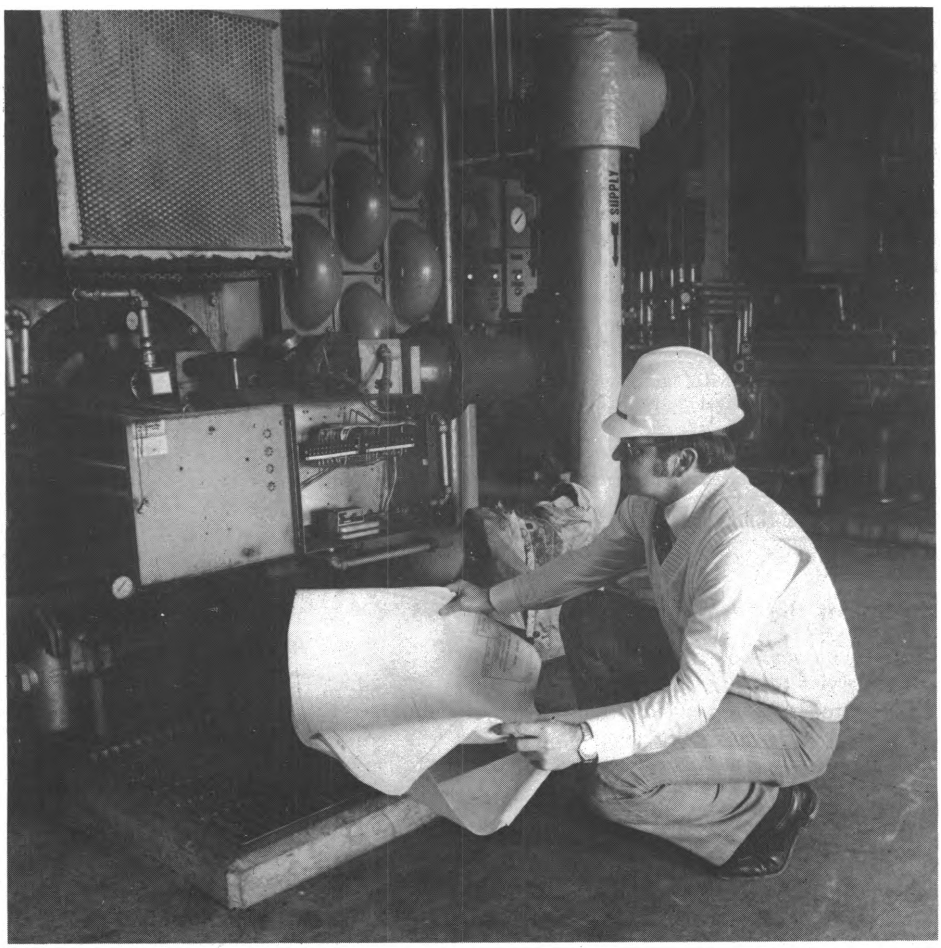
To solve organizational, production, and related problems most efficiently, industrial engineers design data processing systems and apply mathematical concepts (operations research techniques). They also develop management control systems to aid in financial planning and cost analysis, design production planning and control systems to coordinate activities and control product quality, and design or improve systems for the physical distribution of goods and services. Industrial engineers also conduct plant location surveys, where they look for the best combination of sources of raw materials, transportation, and taxes, and develop wage and salary administration systems and job evaluation programs. Many industrial engineers move into management positions because the work is closely related.

Places of Employment

About 185,000 industrial engineers were employed in 1978; more than two-thirds worked in manufacturing industries. Because their skills can be used in almost any type of company, they are more widely distributed among industries than are those in other branches of engineering. For example, some work for insurance companies, banks, construction and mining firms, and public utilities. Hospitals, retail organizations, and other large business firms employ industrial engineers to improve operating efficiency. Still others work for government agencies and colleges and universities. A few are independent consulting engineers.

Employment Outlook

Employment of industrial engineers is expected to grow faster than the average for all occupations through the 1980's. The increasing complexity of industrial operations and the expansion of automated processes, along with industry growth, are factors contributing to employment growth. Increased recognition of the importance of scientific manage-



Many mechanical engineers work in maintenance and production operations.

ment and safety engineering in reducing costs and increasing productivity should create additional opportunities.

Additional numbers of industrial engineers will be required each year to replace those who retire, die, or transfer to other occupations. (See introductory part of this section for information on training requirements and earnings.)

Sources of Additional Information

American Institute of Industrial Engineers, Inc., 25 Technology Park/Atlanta, Norcross, Ga. 30092.

Mechanical Engineers

(D.O.T. 007.061 except -026 and -030, 007.161-022 and -034, and 007.167-014)

Nature of the Work

Mechanical engineers are concerned with the production, transmission, and use of power. They design and develop power-producing machines such as internal combustion engines, steam and gas turbines, and jet and rocket engines. They also design and develop power-using machines such as refrigeration and air-conditioning equipment, elevators, machine tools, printing presses, and steel rolling mills.

The work of mechanical engineers varies by industry and function since many specialties have developed within the field. These specialties include motor vehicles; marine equipment; energy conversion systems; heating, ventilating, and air-conditioning; instrumentation; and machines for specialized industries, such as petroleum, rubber and plastics, and construction.

Large numbers of mechanical engineers do research, test, and design work. Many are administrators or managers, while others work in maintenance, technical sales, and production operations. Some teach in colleges and universities or work as consultants.

Places of Employment

About 200,000 mechanical engineers were employed in 1978. Almost three-fourths were employed in manufacturing—mainly in the primary and fabricated metals, machinery, transportation equipment, and electrical equipment industries. Others worked for government agencies, educational institutions, and consulting engineering firms.

Employment Outlook

Employment of mechanical engineers is expected to increase about as fast as the average for all occupations through the 1980's. The growing demand for industrial machinery and machine tools and the increasing complexity of industrial machinery and processes will be major factors supporting increased employment opportunities. Mechanical engineers will be needed to develop new energy systems and to help solve environmental pollution problems.

Large numbers of mechanical engineers also will be required each year to replace those who retire, die, or transfer to other occupations. (See introductory part of this section for information on training requirements and earnings. See also statement on occupations in the atomic energy field elsewhere in the *Handbook*.)

Sources of Additional Information

The American Society of Mechanical Engineers, 345 E. 47th St., New York, N.Y. 10017.

Metallurgical engineers study the physical properties of metals.

Metallurgical Engineers

(D.O.T. 011.061 except -010, and .161.010)

Nature of the Work

Metallurgical engineers develop new types of metal with characteristics that are tailored to meet specific requirements, such as heat resistance, high strength but light weight, or high malleability. They also develop methods to process and convert metals into useful products. Most of these engineers generally work in one of the three main branches of metallurgy—extractive or chemical, physical, and mechanical. Extractive metallurgists are concerned with extracting metals from ores, and refining and alloying them to obtain useful metal. Physical metallurgists deal with the nature, structure, and physical properties of metals and their alloys, and with methods of converting refined metals into final products. Mechanical metallurgists develop methods to work and shape metals such as casting, forging, rolling, and drawing. Scientists working in this field are known as metallurgists or materials scientists, but the distinction between scientists and engineers in this field is small.

Places of Employment

The metalworking industries—primarily the iron and steel and nonferrous metals industries—employed over one-half of the estimated 16,000 metallurgical and materials engineers in 1978. Metallurgical engineers also work in industries that manufacture machinery, electrical equipment, and aircraft and parts, and in the mining industry. Some work for government agencies and colleges and universities.

Employment Outlook

Employment of metallurgical and materials engineers is expected to grow faster than the average for all occupations through the

1980's. An increasing number of these engineers will be needed by the metalworking industries to develop new metals and alloys as well as to adapt current ones to new needs. For example, communications equipment, computers, and spacecraft require lightweight metals of high purity. As the supply of high-grade ores diminishes, more metallurgical engineers will be required to develop new ways of recycling solid waste materials in addition to processing low-grade ores now regarded as unprofitable to mine. Metallurgical engineers also will be needed to solve problems associated with the efficient use of nuclear energy. (See introductory part of this section for information on training requirements and earnings. Also see statement on the iron and steel industry elsewhere in the *Handbook*.)

Sources of Additional Information

The Metallurgical Society of AIME, P.O. Box 430, Warrendale, Pa. 15086.

American Society for Metals, Metals Park, Ohio 44073.

Mining Engineers

(D.O.T. 010.061 except -018)

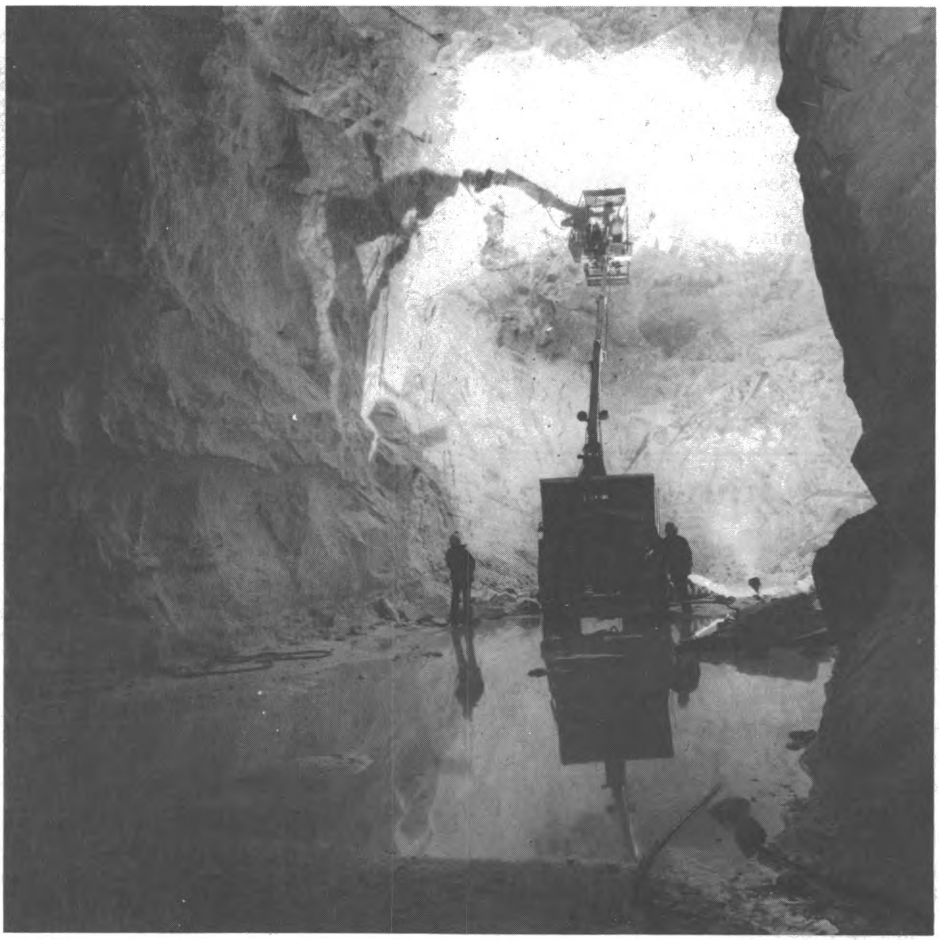
Nature of the Work

Mining engineers find, extract, and prepare minerals for manufacturing industries to use. They design open pit and underground mines, supervise the construction of mine shafts and tunnels in underground operations, and devise methods for transporting minerals to processing plants. Mining engineers are responsible for the economical and efficient operation of mines and mine safety, including ventilation, water supply, power, communications, and equipment maintenance. Some mining engineers work with geologists and metallurgical engineers to locate and appraise new ore deposits. Others develop new mining equipment or direct mineral processing operations, which involve separating minerals from the dirt, rock, and other materials they are mixed with. Mining engineers frequently specialize in the mining of one specific mineral such as coal or copper.

With increased emphasis on protecting the environment, many mining engineers have been working to solve problems related to mined-land reclamation and water and air pollution.

Places of Employment

About 6,000 mining engineers were employed in 1978. Most work in the mining industry. Some work for firms that produce equipment for the mining industry, while others work in colleges and universities, in government agencies, or as independent consultants.



Mining engineers are usually employed at the location of mineral deposits.

Mining engineers are usually employed at the location of mineral deposits, often near small communities. However, those in research, teaching, management, consulting, or sales often are located in metropolitan areas.

Employment Outlook

Employment of mining engineers is expected to increase much faster than the average for all occupations through the 1980's. Efforts to attain energy self-sufficiency should spur the demand for coal, and therefore for mining engineers in the coal industry. The increase in demand for coal will depend, to a great extent, on the availability and price of other energy sources such as petroleum, natural gas, and nuclear energy. More technologically advanced mining systems and further enforcement of mine health and safety regulations also will increase the need for mining engineers. In addition, exploration for all other minerals is also increasing. Easily mined deposits are being depleted, creating a need for engineers to devise more efficient methods for mining low-grade ores. Employment opportunities also will arise as new alloys and new uses for metals increase the demand for less widely used ores. Recovery of metals from the sea and the development of oil shale deposits could present major challenges to the mining engineer. (See introductory part of this section for information on training requirements and earnings. See also statement on mining elsewhere in the *Handbook*.)

Sources of Additional Information

The Society of Mining Engineers of AIME, Caller Number D, Littleton, Colo. 80123.

Petroleum Engineers

(D.O.T. 010.061 except -014 and -026, .131-010, .161-010 and -014, .167, and .261-010)

Nature of the Work

Petroleum engineers are mainly involved in exploring and drilling for oil and gas. They work to achieve the maximum profitable recovery of oil and gas from a petroleum reservoir by determining and developing the best and most efficient production methods.

Since only a small proportion of the oil and gas in a reservoir will flow out under natural forces, petroleum engineers develop and use various artificial recovery methods, such as flooding the oil field with water to force the oil to the surface. Even when using the best recovery methods, about half the oil is still left in the ground. Petroleum engineers' research and development efforts to increase the proportion of oil recovered in each reservoir can make a significant contribution to increasing available energy resources.

Petroleum engineers evaluating the oil and gas potential of a newly drilled well.

Places of Employment

About 17,000 petroleum engineers were employed in 1978, mostly in the petroleum industry and closely allied fields. Their employers include not only the major oil companies, but also the hundreds of smaller independent oil exploration and production companies. They also work for companies that produce drilling equipment and supplies. Some petroleum engineers work for banks and other financial institutions which need their knowledge of the economic value of oil and gas properties. A small number work for engineering consulting firms or as independent consulting engineers, and for Federal and State governments.

The petroleum engineer's work is concentrated in places where oil and gas are found. Almost three-fourths of all petroleum engineers are employed in the oil-producing States of Texas, Oklahoma, Louisiana, and California. There are many American petroleum engineers working overseas in oil-producing countries.

Employment Outlook

The employment of petroleum engineers is expected to grow faster than the average for all occupations through the 1980's. Economic expansion will require increasing supplies of petroleum and natural gas, even with energy conservation measures. With efforts to attain energy self-sufficiency and with high petroleum prices, increasingly sophisticated and expensive recovery methods will be used. New sources of oil, such as oil shale and new offshore oil sources, may be developed. Also, new drilling techniques will be needed in developing geothermal energy. All of these factors will contribute to increasing demand for petroleum engineers. (See introductory part of this section for information on training requirements and earnings.)

Sources of Additional Information

Society of Petroleum Engineers of AIME, 6200 North Central Expressway, Dallas, Tex. 75206.

FBI Special Agents

(D.O.T. 375.167-042)

Nature of the Work

Federal Bureau of Investigation (FBI) special agents investigate violations of Federal laws in connection with bank robberies, kidnappings, white-collar crime, thefts of Government property, organized crime, espionage, and sabotage. The FBI, which is part of the U.S. Department of Justice, has jurisdiction over many different Federal investigative matters. Special agents, therefore, may be assigned to any type of case, although those with specialized training usually work on cases related to their background. Agents with an accounting background, for example, may investigate white-collar crimes such as bank embezzlements or fraudulent bankruptcies or land deals.

Because the FBI is a fact-gathering agency, its special agents function strictly as investigators, collecting evidence in cases in which the U.S. Government is or may be an interested party. In their casework, special agents conduct interviews, examine records, observe the activities of suspects, and participate in raids. Because the FBI's work is highly confidential, special agents may not disclose any of the information gathered in the course of their official duties to unauthorized persons, including members of their families. Frequently agents must testify in court about cases that they investigate.

Although they work alone on most assignments, agents communicate with their supervisors by radio or telephone as the circumstances dictate. In performing potentially dangerous duties, such as arrests and raids, two agents or more are assigned to work together.

Working Conditions

Although FBI special agents work out of clean, well lighted offices, they spend a great deal of their time away from their desks conducting investigations. They may visit homes, offices, or industrial plants and interview persons from all walks of life. Their work requires use of automobiles and firearms and occasionally involves some risk of personal injury.

Special agents are subject to call 24 hours a day and must be available for duty at all times. Their duties require some travel, and occasionally they may be transferred to another location.

Places of Employment

About 8,000 persons were special agents in 1978. Most agents were assigned to the FBI's 59 field offices located throughout the Nation. They worked in cities where field office headquarters are located or in resident agencies (suboffices) established under field office supervision to provide prompt and efficient handling of investigative matters arising throughout the field office territory. Some agents are assigned to the Bureau headquarters in Washington, D.C., which supervises all FBI activities.

Training, Other Qualifications, and Advancement

To be considered for appointment as an FBI special agent, an applicant usually must be a graduate of a State-accredited law school or a college graduate with a major in accounting. The law school training must have been preceded by at least 2 years of undergraduate college work.

From time to time, as the need arises, the

Newly appointed FBI special agents receive intensive training in the use of firearms.

FBI accepts applications from persons who have a 4-year college degree with a physical science major or fluency in a foreign language, or who have 3 years of professional, executive, complex investigative, or other specialized experience.

Applicants for the position of FBI special agent must be citizens of the United States, be at least 23 years old, but less than 35 before they begin duty, and be willing to serve anywhere in the United States or Puerto Rico. They must be capable of strenuous physical exertion, and have excellent hearing and vision, normal color perception, and no physical defects that would prevent their using firearms or participating in dangerous assignments. All applicants must pass a rigid physical examination, as well as written and oral examinations testing their aptitude for meeting the public and conducting investigations. All of the tests except the physical examinations are given by the FBI at its facilities. Background and character investigations are made of all applicants. Appointments are made on a probationary basis and become permanent after 1 year of satisfactory service.

Each newly appointed special agent is given about 15 weeks of training at the FBI Academy at the U.S. Marine Corps Base in Quantico, Va., before assignment to a field office. During this period, agents receive intensive training in defensive tactics and the use of firearms. In addition, they are thoroughly schooled in Federal criminal law and procedures, FBI rules and regulations, fingerprinting, and investigative work. After assignment to a field office, the new agent usually works closely with an experienced agent for about 2 weeks before handling any assignments independently.

All administrative and supervisory jobs are filled from within the ranks by selecting those FBI special agents who have demonstrated the ability to assume more responsibility.

Employment Outlook

The jurisdiction of the FBI has expanded greatly over the years. Although it is impossible to forecast special agent personnel requirements, employment may be expected to increase with growing FBI responsibilities.

The FBI provides a career service and its rate of turnover is traditionally low. Nevertheless, the FBI is always interested in applications from qualified persons.

Earnings

The entrance salary for FBI special agents was $17,532 in late 1978. Special agents are not appointed under Federal Civil Service regulations, but, like other Federal employees, they receive periodic within-grade salary raises if their work performance is satisfactory; they can advance in grade as they gain experience. Salaries of supervisory agents start at $32,442 a year.

Agents frequently work longer than the customary 40-hour week and, under specified conditions, receive overtime pay up to $4,400 a year. Agents are required to retire at age 55 if they have served at least 20 years.

Related Occupations

FBI special agents conduct investigations and apprehend lawbreakers. Other related investigative and law enforcement occupations include: Detectives, private investigators, police officers, deputy sheriffs, Secret Service agents, Internal Revenue Service Agents, Border Patrol agents, fire marshals, and fish and game wardens.

Sources of Additional Information

The Federal Bureau of Investigation, U.S. Department of Justice, Washington, D.C. 20535.

Flight Attendants

(D.O.T. 352.367-010)

Nature of the Work

Flight attendants (also called stewardesses and stewards) are aboard almost all commercial passenger planes to help make the passengers' flight safe, comfortable, and enjoyable.

Before each flight, attendants see that the passenger cabin is in order. They check that supplies, such as food, beverages, blankets, and reading material, are adequate, and that first aid kits and other emergency equipment are aboard. As passengers come aboard, attendants greet them, check their tickets, and assist them by hanging up coats and stowing small pieces of luggage under the seats.

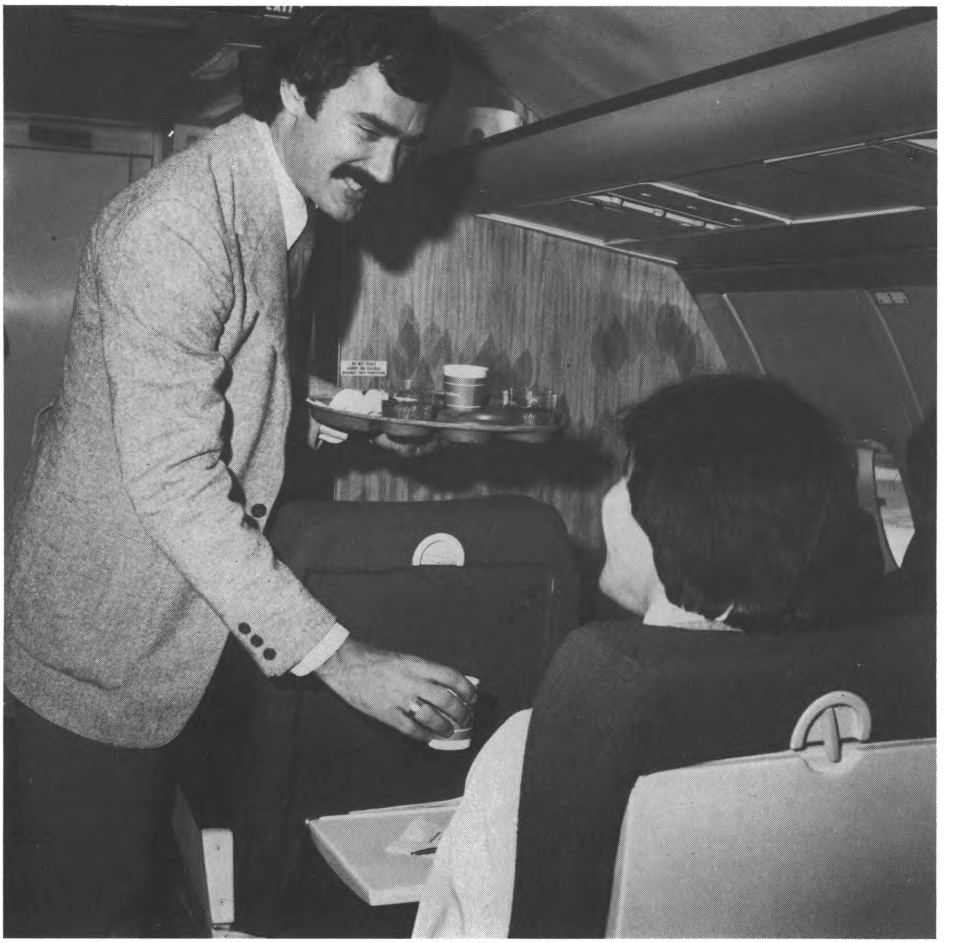
Before the plane takes off, attendants use the public address system to instruct passengers in the use of emergency equipment and check to see that all passengers have their seat belts fastened. In the air, they answer questions about the flight, distribute magazines and pillows, and help care for small children, elderly persons, and handicapped persons. Attendants also serve cocktails and other refreshments. On many flights, they heat and distribute precooked meals.

One of the most important functions of attendants is to assist passengers in the rare event of an emergency. These range from a disabled engine, where passengers must be reassured, to emergency landings, where attendants evacuate the plane, opening doors and inflating emergency slides. Attendants also must be prepared to administer first aid to passengers who become ill during the flight.

Working Conditions

Since airlines operate around the clock 365 days a year, attendants may work at night, on holidays, and on weekends. They usually fly no more than 80 hours a month, but they may devote up to 35 hours a month to the ground duties involved in preparing their planes for flights. As a result of variations in scheduling and limitations on flying time, many attendants have 15 days or more off each month. Attendants may be away from their home bases about one-third of the time or more. When they are away from home, the airlines provide hotel accommodations and an allowance for meal expenses.

Flight attendants have the opportunity to meet interesting people and see new places. The combination of free time and discount air fares provides substantial opportunity for travel. However, the work can be strenuous and trying. Many short flights require speedy service if all passengers are to be served. Poor



Flight attendants help make the passengers' flight safe, comfortable and enjoyable.

weather can make it difficult to serve drinks and meals. Attendants stand during much of the flight and must remain pleasant and efficient regardless of how tired they may be.

Places of Employment

About 48,400 flight attendants worked for the airlines in 1978. Most attendants are stationed in major cities at the airlines' main bases; nearly three-fifths work near Chicago, Dallas, Los Angeles, Miami, New York, and San Francisco. Airliners generally carry 1 to 10 flight attendants, depending on the number of seats on the plane and the proportion of economy to first-class passengers. Large aircraft like the Boeing 747 may have as many as 16 flight attendants.

Training, Other Qualifications, and Advancement

The airlines place great stress on the hiring of poised, tactful, and resourceful people. In particular, applicants should be able to talk comfortably with strangers. As a rule, applicants must be at least 19 years old. They must be in excellent health and have good vision. Vision may be corrected with contact lenses or, on most airlines, with glasses. Applicants also must speak clearly.

Applicants must be high school graduates. Those having several years of college or experience in dealing with the public are preferred. Flight attendants for international airlines generally must be able to speak an appropriate foreign language fluently.

Most large airlines give newly hired flight attendants about 5 weeks of training in their own schools. Transportation to the training centers and an allowance while in training may be provided. Trainees are taught how to react to emergencies, including instruction on evacuating an airplane, operating an oxygen system, and giving first aid. Attendants also are taught flight regulations and duties, and company operations and policies. Additional courses in passport and customs regulations are given to trainees for the international routes. Towards the end of their training, students go on practice flights. The few airlines that do not operate schools generally send new employees to the school of another airline.

After completing their training, flight attendants are assigned to one of their airline's main bases. New attendants are placed on reserve and either fill in on extra flights or replace attendants who are sick or on vacation. They usually remain on reserve for at least 1 year; at some cities it may take as long as 5 years to advance from reserve status. When reserve attendants are on duty, they must leave word where they can be reached and be available for work at short notice. More senior attendants who no longer are on reserve bid for regular assignments. Because these assignments also are based on seniority, the most experienced attendants usually get their choice of base and flights.

Opportunities for advancement are limited. However, some attendants may advance to flight service instructor, customer service director, instructor, or recruiting representative.

Employment Outlook

Employment of flight attendants is expected to grow much faster than the average for all occupations through the 1980's. In addition to growth, openings will occur because of the need to replace experienced attendants who retire, die, or transfer to other occupations.

Increases in population and income are expected to increase the number of airline passengers. To deal with this growth, airlines usually enlarge their capacity by increasing the number and size of planes in operation. Since the Federal Aviation Administration safety rules require one attendant for every 50 seats, more flight attendants will be needed. Job opportunities may vary from year to year, however, because air travel is sensitive to ups and downs in the economy.

Because the job is attractive and offers a chance to travel, many people are interested in becoming flight attendants. Applicants can expect keen competition for the available jobs because the number of applicants is expected to exceed the number of openings. Applicants with 2 years of college and experience in dealing with the public have the best chance of being hired.

Earnings

Average monthly earnings of all flight attendants were $1,200 in 1978. According to a number of union contracts, salaries of most beginning flight attendants on domestic flights ranged from $700 to $800 a month, while those on international flights earned from $850 to $950. As an additional benefit, flight attendants and their immediate families are entitled to reduced fare transportation on their own and most other airlines.

Most flight attendants are members of either the Transport Workers Union of America or the Association of Flight Attendants.

Related Occupations

Other jobs that involve helping people and require the ability to be pleasant even under trying circumstances include tour guide, gate agent (air transportation), ground host/hostess (air transportation), and social director.

Sources of Additional Information

Information about job opportunities in a particular airline and the qualifications required may be obtained by writing to the personnel manager of the company. Addresses of companies are available from:

Air Transport Association of America, 1709 New York Ave. NW., Washington, D.C. 20006.

Food Technologists

(D.O.T. 041.081-010)

Nature of the Work

In the past, consumers processed most food in the home, but today industry processes almost all foods. A key worker involved in the development and processing of the large variety of foods available today is the *food technologist*.

Food technologists investigate the chemical, physical, and biological nature of food and apply this knowledge to processing, preserving, packaging, distribution, and storing an adequate, nutritious, wholesome, and economical food supply. Over one-third of all food technologists work in research and development. Others work in quality assurance laboratories or in production or processing areas of food plants. Some teach or do basic research in colleges and universities, and others work in sales or management positions.

Food technologists in basic research study the structure and composition of food and the changes it undergoes in storage and processing. For example, they may develop new sources of proteins, study the effects of processing on micro-organisms, or search for factors that affect the flavor, texture, or appearance of foods. Food technologists who work in applied research and development create new foods and develop new processing methods. The also work to improve existing foods by making them more nutritious and enhancing their flavor, color, and texture.

Food technologists seek to have each product retain its characteristics and nutritive value during processing and storage. They also conduct chemical and microbiological tests to see that products meet industry and government standards, and they may determine the nutritive contents of products in order to comply with Federal nutritional labeling requirements.

In quality control laboratories, food technologists check raw ingredients for freshness, maturity, or suitability for processing. They may use machines that test for tenderness by finding the amount of force necessary to puncture the item. Periodically, they inspect processing line operations to insure conformance with government and industry standards. For example, they test processed foods for sugar, starch, protein, fat, vitamin, and mineral content. They make sure that, after processing, various enzymes are inactive and microbial levels are adequately low so that the food will not spoil during storage or present a safety hazard. Other food technologists are involved in developing and improving packaging and storage methods.

Food technologists in processing plants prepare production specifications, schedule processing operations, maintain proper temperature and humidity in storage areas, and supervise sanitation operations, including the efficient and economical disposal of wastes. To increase efficiency, they advise management on the purchase of equipment and recommend new sources of materials.

Some food technologists apply their knowledge in areas such as market research, advertising, and technical sales. Others teach in colleges and universities.

Working Conditions

Food technologists work under a variety of conditions. Most work regular hours in offices, laboratories, or classrooms. Food technologists who work in production or quality control positions work in or near food processing areas, sometimes under noisy, hot, or cold conditions, but they usually do not encounter unhealthy or unsafe conditions.

Places of Employment

An estimated 15,000 persons worked as food technologists in 1978. Food technologists work in all sectors of the food industry and in every State. The types of products and processes with which they work may depend on the locality. For example, in Maine and Idaho, they work with potato processing; in the Midwest, with cereal products and meatpacking; and in Florida and California, with citrus fruits and vegetables.

Some food technologists do research for Federal agencies such as the Food and Drug Administration and the Departments of Agriculture and Defense; others work in State regulatory agencies. A few work for private consulting firms and international organizations such as the United Nations. Some teach or do research in colleges and universities. (See statement on college and university faculty elsewhere in the *Handbook*.)

Training, Other Qualifications, and Advancement

A bachelor's degree with a major in food technology or in one of the physical or life sciences, such as chemistry or biology, is the usual minimum requirement for beginning jobs in food techology. An advanced degree is necessary for many jobs, particularly research and college teaching and for some management jobs in industry.

Over 60 colleges and universities offered programs leading to the bachelor's degree in food technology in 1978. Undergraduate students majoring in food technology usually take courses in physics, chemistry, mathematics, biology, the social sciences and humanities, and business administration, as well as a variety of food technology courses. Food technology courses cover areas such as preservation, processing, sanitation, and marketing of foods.

Most of the colleges and universities that provide undergraduate food technology programs also offer advanced degrees. Graduate students usually specialize in a particular area of food technology. Requirements for the master's or doctor's degree vary by institution, but usually include extensive research. A thesis, which is a report of original research findings, is required for the doctor's degree and, in some institutions, for the master's degree.

People planning careers as food technologists should have analytical minds and like details and technical work. Food technologists must be able to express their ideas clearly to others.

Food technologists with a bachelor's degree might start work as quality assurance chemists or as assistant production managers. After gaining experience, they can ad-

Many food technologists work in quality control laboratories.

vance to more responsible management jobs. A food technologist might also begin as a junior food chemist in a research and development laboratory of a food company, and be promoted to section head or another research management position.

People who have master's degrees may begin as food chemists in a research and development laboratory. Those who have the Ph. D. degree usually begin their careers doing basic research or teaching.

Employment Outlook

Employment of food technologists is expected to grow more slowly than the average for all occupations through the 1980's. Most openings will result from the need to replace those who die, retire, or transfer to other fields, although some openings will arise from growth in demand for these workers.

Employment is expected to grow somewhat as the food industry responds to the challenge of providing wholesome and economical foods that can meet changing consumer preferences and food standards. In addition, both private households and food service institutions that supply customers such as airlines and restaurants will demand a greater quantity of processed convenience foods. However, the expected slow growth of the food processing industry will result in the slower than average growth in employment of food technologists.

An increasing number of food technologists are expected to find jobs in research and product development. In recent years, expenditures for research and development in the food industry have increased moderately and probably will continue to rise. Through research, new foods are being produced from modifications of wheat, corn, rice, and soybeans. For example, food scientists are working to improve "meat" products made from vegetable proteins. There will be an increased need for food scientists in quality control and production because of the complexity of products and processes and the application of higher processing standards and new government regulations.

Earnings

Food technologists had relatively high earnings in 1978, about twice the average for all nonsupervisory workers in private industry, except farming. According to a survey of the Institute of Food Technologists in 1977, food technologists with the bachelor's degree had average starting salaries of about $12,000 a year. Those with a master's degree started at about $15,000, and those with the Ph. D. degree at about $18,000.

In the Federal Government in 1978, food technologists with a bachelor's degree could start at $10,507 or $13,014 a year, depending on their college grades. Those with a master's degree could start at $13,014 or $15,920, and those with a Ph. D. could begin at $19,263 or $23,087. The average salary for experienced food technologists in the Federal Government was about $26,600 a year in 1978.

Related Occupations

Food technology is closely related to chemistry and, to a lesser extent, to biology. Other occupations in which the work is related to food technology are life and environmental scientists, engineers, and engineering and science technicians.

Sources of Additional Information

For information on careers in food technology contact:

Institute of Food Technologists, Suite 2120, 221 North LaSalle St., Chicago, Ill. 60601.

Foresters

(D.O.T 040.061-034)

Nature of the Work

Forests are one of our most important natural resources. We use their products—trees—for building materials, paper, fuel, and a variety of other uses. The forests help clean the air we breathe, and protect our water supplies and wildlife, as well as provide recreational opportunities for people. With all of these multiple demands made upon them, forests must be managed, developed, and protected, or they will simply not be available for use by future generations. Foresters are the trained professionals who help manage, develop, and protect our vital forest resources.

Foresters plan and supervise the growing, protection and utilization of trees. They make maps of forest areas, estimate the amount of standing timber and future growth, and manage timber sales. All of these things involve working with other people. Managing timber sales, for example, involves dealing with landowners and supervising the work of loggers. Foresters also protect the trees from fire, harmful insects, and disease.

Some foresters may be responsible for other duties ranging from wildlife protection and watershed management to the development and supervision of camps, parks, and grazing lands. Other foresters do research, provide information to forest owners and to the general public (called extension work), and teach at colleges and universities.

Foresters often specialize in one area of work, such as timber management, outdoor recreation, or forest economics. Some of these areas are recognized as distinct professions.

Working Conditions

Working conditions for foresters vary considerably, according to the type of work they perform. The old image of foresters as solitary horseback riders, singlehandedly protecting large areas of land far from civilization, however, no longer holds true. Modern foresters spend a great deal of time working with people. They must deal constantly with landowners, loggers, forestry aides, and a wide variety of other people.

The work still can be physically demanding, though. Beginning foresters often spend considerable time outdoors in all kinds of weather, sometimes in remote areas. To get to these areas, they use airplanes, helicopters, and four-wheel drive vehicles. Foresters also may have to work long hours on emergency duty, as in firefighting or search and rescue missions.

Many experienced foresters advance to jobs in the office where they use maps and computers to plan and organize the activities of the staff.

Places of Employment

Over 25,000 persons worked as foresters in 1978. Nearly 2 out of 5 worked in private industry, mainly for pulp and paper, lumber, logging, and milling companies. About one-fourth worked for the Federal Government, primarily in the Forest Service of the Department of Agriculture. The remainder worked for State and local governments, colleges and universities or consulting firms, or were self-employed either as consultants or forest owners.

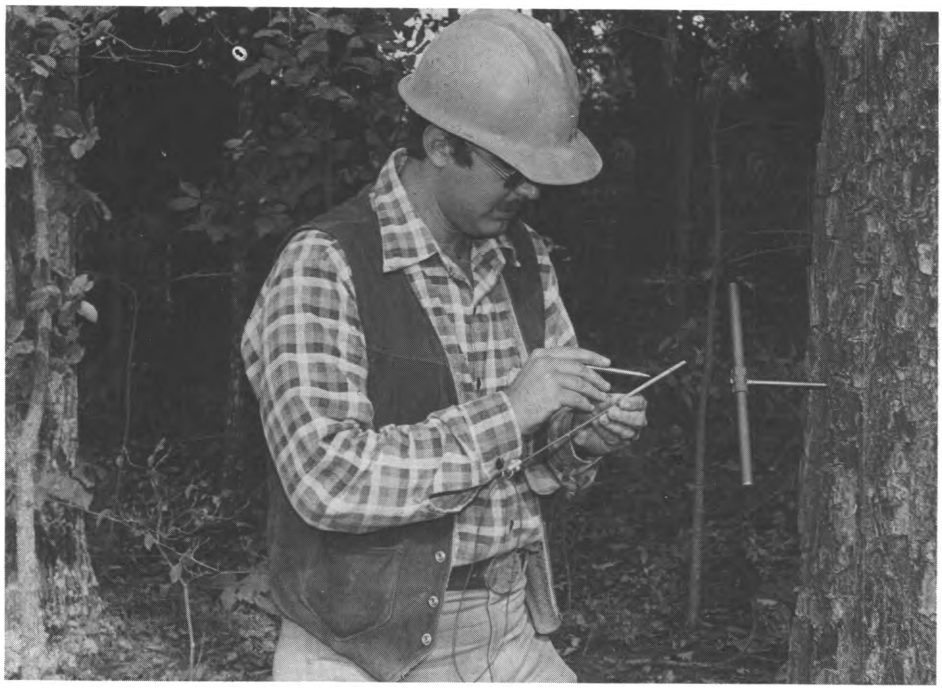
Training, Other Qualifications, and Advancement

A bachelor's degree with a major in forestry is the minimum educational requirement for persons desiring professional careers in forestry. However, due to keen job competition and the increasingly complex nature of the forester's work, many employers prefer graduates who hold advanced degrees. Certain jobs such as teaching and research require advanced degrees.

To qualify for college work, high school students who are considering careers in forestry should get as broad an educational background as they can. Students should, however, take as many science courses as possible, including courses in chemistry, physics, mathematics, and the biological sciences. Courses in English literature and public speaking also are helpful.

Education in forestry leading to a bachelor's or higher degree was offered in 1978 by 50 colleges and universities, of which 43 were accredited by the Society of American Foresters. Curriculums stress the liberal arts and communications skills as well as technical forestry subjects. Courses in forest economics and business administration supplement the student's scientific and technical knowledge. Many colleges require students to spend one summer in a field camp operated by the college. All schools encourage summer jobs that give firsthand experience in forest or conservation work.

In addition to meeting the intellectual demands of forestry, foresters must enjoy work-



Foresters take core samples from trees to assess the age and growth rate of timber stands.

ing outdoors, be physically hardy, and be willing to move, often to remote places. Foresters should also work well with people and express themselves clearly.

Forestry graduates usually work under the supervision of experienced foresters. After gaining experience, they may advance to more responsible positions. In the Federal Government, an experienced forester may supervise an entire forest area, and may advance to regional forest supervisor or to a top administrative position. In private industry, foresters start by learning the practical and administrative aspects of the business. Many foresters work their way up to top managerial positions within their companies.

Employment Outlook

Employment of foresters is expected to grow about as fast as the average for all occupations through the 1980's. In recent years, however, the number of persons earning degrees in forestry has exceeded the number of openings in the field. If the number of degrees granted each year remains at present levels, competition is expected to persist throughout the period. Opportunities will be better for persons who can offer an employer either an advanced degree or several years' experience.

The country will need more foresters to ensure an increasing output of forest products. Employment also may increase as we become more aware of the need to conserve and replenish our forest resources, and to improve the environmental quality of our forest lands.

Private owners of timberland may well employ more foresters as they recognize the need for—and the higher profitability of—improved forestry and logging practices. The forest products industry will require additional foresters to apply new techniques for using the entire forest crop, to develop methods of growing superior trees in a shorter period of time, and to do research in the fields of plant genetics and fertilization.

Employment of foresters will probably continue to grow faster in private industry than in the Federal Government where budget limitations may restrain growth. State government agencies will probably hire more foresters through Federal-State cooperative programs for fire control, protection against insects and disease, recreation, and technical assistance to owners of forest lands.

The expected rapid increase in the employment of technicians for routine tasks will enable the forester to spend more time in supervising and managing the forest.

Earnings

According to the limited data available, the average starting salary for foresters in 1978 was about $12,000 a year, while experienced foresters averaged over $20,000.

In private industry, starting foresters averaged $12,000 a year in 1978 and the overall average salary was $21,000.

Graduates entering the Federal Government as foresters in early 1979 with just a bachelor's degree started at $10,507 a year. However, because of keen competition, most foresters hired by the Federal Government either held a master's degree or had some experience, and generally started at $13,014 a year. Ph. D.'s generally started at $15,920 or $19,263 a year. The median annual salary in 1979 for federally employed foresters exceeded $22,000.

In local government, foresters generally began at over $10,000 a year in 1978, while their median annual salary was $16,000. Starting salaries in State governments were about $10,600 in 1978, and State median salaries were $17,000 per year. College professors generally started at about $14,000 annually in 1978, while their median salary was over $22,000 per year. Many faculty foresters supplement their regular salaries with income from lecturing, consulting, and writing.

Related Occupations

Foresters are not the only workers concerned with managing, developing, and protecting our natural resources. Other workers with similar responsibilities include agronomists, farmers, farm managers, ranchers, range managers, fish hatchery managers, soil conservationists, and wildlife managers.

Sources of Additional Information

General information about the forestry profession, lists of reading materials, and lists of schools offering education in forestry are available from:

Society of American Foresters, 5400 Grosvenor Lane, Washington, D.C. 20014.

National Forest Products Association, 1619 Massachusetts Ave. NW., Washington, D.C. 20036.

General career information also is available from:

American Forest Institute, 1619 Massachusetts Ave. NW., Washington, D.C. 20036.

American Forestry Association, 1319 18th St. NW., Washington, D.C. 20036.

For details on forestry careers in the Forest Service, contact:

U.S. Department of Agriculture, Forest Service, Washington, D.C. 20250.

Geographers

(D.O.T. 018.131-010, .261, .262-010, and .281-010; 029.067 and .167-010; and 090.227-010)

Nature of the Work

Geographers do research on a wide range of social, economic, and environmental issues. They study the spatial distribution and location of various characteristics of the earth's surface. Such studies help to explain changing patterns of human settlement—where people live, why they are located there, and how they earn a living.

Geographers are involved in a variety of activities. Most are college or university teachers and, like other faculty members, do research and consulting in addition to teaching. (For more information, see the *Handbook* statement on college and university faculty.) Other geographers are primarily researchers or analysts. They prepare reports and recommendations and may work for consulting firms, research organizations, business and industrial firms, or government agencies. Some geographers use their specialized knowledge and research skills in planning or administrative jobs in such fields as economic development or environmental resource management.

These geographers are making use of mapping and statistical techniques in their study of forms.

Depending on their training and field of interest—or on a client's needs—a geographer might examine the distribution of landforms; study variations in climate, soils, or vegetation; or analyze such resources as water and minerals. Like other social scientists, geographers are concerned with human resources, and frequently their research overlaps that of other disciplines. Thus, a geographer might study political organizations, transportation systems, marketing systems, patterns of industrial development, housing, or public health.

Research techniques depend on the topic under study. However, field study, including interviews and the use of surveying and meteorological instruments, is a standard technique. In addition, geographers analyze maps, aerial photographs, and data transmitted by remote sensing equipment on satellites. Some geographers construct maps, graphs, and diagrams in the course of their research. Geographers typically make use of advanced statistical techniques and mathematical models—and, frequently, a computer—when they analyze or map the data they have obtained.

Geographers specialize, as a rule. *Economic geographers* deal with the geographic distribution of an area's economic activities—manufacturing, mining, forestry, agriculture, trade, and communications. Their research might be used for feasibility studies, to determine the costs and benefits of putting resources to use in a particular way. *Political geographers* are concerned with the relationship of geography to politics. They might be asked to help define and describe political boundaries, including those of cities, counties, and administrative subdivisions, as well as offshore areas. *Urban geographers* study cities. They provide background information and make recommendations in such areas as community development, population policy, housing, transportation, and industrial development.

The physical characteristics of the earth are the focus of *physical geographers*. They are concerned with the impact of the configuration of the earth's surface on human activities and study the earth's relief, drainage, vegetation patterns, wildlife distribution, and climates. They also study the effect of physical characteristics on navigation and other activities. Typically, they specialize in a particular branch of physical geography such as geomorphology—the study of landforms—or hydrology—the study of water. Geographers specializing in climatology use atmospheric data to describe overall climatic conditions and to do research into the causes of climatic change. They may determine the significance of climatic conditons for defense, conservation, agriculture, health, transportation, marketing, and other activities.

Regional geographers study the physical, climatic, economic, political, and cultural characteristics of a particular region or area, which may range in size from a river basin to a State, a country, or even a continent. In addition to an understanding of the geography of a region, some knowledge of its history, customs, and languages may be necessary.

Cartographers compile and interpret data and design and construct maps and charts. They also conduct research in surveying and mapping techniques and procedures.

Medical geographers study the effect of the environment on health and take into account such factors as climate, vegetation, mineral traces in water, and atmospheric pollution. They work with public health officials, biostatisticians, and others to determine how our health is influenced by our physical surroundings—including access to health-care facilities.

Geographers may specialize even further in other subfields, including agricultural geography, biogeography, conservation, cultural geography, geographical methods and techniques, historical geography, location theory, population geography, remote sensing, rural geography, social geography, and transportation.

Formal training in geography provides the background for a wide range of jobs requiring expertise in environmental resources, regional planning, and social science research. Examples of such jobs are aerial photo interpreter, climatologist, community development specialist, ecologist, intelligence analyst, map analyst, land economist, marketing analyst, regional planner, research analyst, site researcher, and transportation planner. Jobs such as these generally require knowledge not only of geography, but of other disciplines as well. Particularly useful are combinations of geography with economics, political science, sociology, anthropology, geology, or urban planning.

Working Conditions

Geographers employed by colleges and universities have flexible work schedules, dividing their time among teaching, research, and administrative responsibilities. Geographers working for government agencies and private firms, on the other hand, have much more structured work schedules. They often work alone behind a desk or a drafting table, reading and writing reports on their research or constructing maps and charts. Many experience the pressures of deadlines and tight schedules and sometimes must work overtime. Their routine may be interrupted by telephone calls, letters, special requests for information, meetings, or conferences.

Increasingly, geographers conduct research and surveying operations in the field. Under these circumstances, they are an integral part of a research team. Fieldwork may require traveling to remote areas, working under severe weather conditions, living in primitive housing, and adjusting to different cultural environments. Physical stamina also is important because fieldwork requires long working hours, occasionally under adverse conditions.

Places of Employment

About 10,000 persons worked as geographers in 1978. Colleges and universities employ over half of all geographers. The Federal Government also is an important employer of geographers, and many work in the Washington, D.C. area. For these geographers, employed mostly by mapping and intelligence agencies, skills in cartography, photogrammetry, and remote sensing data interpretation are important.

The principal Federal employers are the Departments of Defense, Interior, Commerce, and Agriculture. Other agencies include the Departments of State; Transportation; Education, and Health and Human Services; and Energy; the Environmental Protection Agency (EPA); National Aeronautics and Space Administration (NASA); and the Central Intelligence Agency (CIA).

Geographers employed by State and local governments work mostly in the fields of urban and regional planning, economic development, and community development.

Private industry employs some geographers as researchers and planners; often, they specialize in location analysis. Geographers work for textbook and map publishers, travel agencies, manufacturing firms, real estate development corporations, insurance companies, communications and transportation firms, and chainstores. Some work for scientific foundations and research organizations or run their own research or consulting business.

Training, Other Qualifications, and Advancement

The minimum educational requirement for beginning positions in geography in govern-

ment, industry, or secondary schools usually is a bachelor's degree with a major in the field. However, a master's degree increasingly is required for many entry level positions. Applicants to entry level jobs would find it helpful to have training in a specialty such as cartography, photogrammetry, remote sensing data interpretation, statistical analysis including computer science, or environmental analysis.

A master's degree is the minimum requirement for the position of college instructor in junior colleges and some 4-year schools, and is important for advancement in business and government. However, a Ph. D. or advancement into doctoral candidacy is required for a first appointment at some institutions of higher education. A Ph. D. degree and a record of significant published research is required for a professorship and is necessary to gain tenure. The Ph. D. degree also is necessary for many senior level planning, research, and administrative positions in government, industry, research organizations, and consulting firms.

In the Federal Government, geographers generally must have a college degree with a minimum of 24 semester hours in geography or related fields. Cartographers need a college degree including at least 18 hours in one or a combination of the following: Cartography, photogrammetry, geodesy, or plane surveying. However, because competition for Federal jobs is keen, additional education or experience may be required.

About 340 colleges and universities offered programs in geography in 1978. Some departments of geography are combined with other disciplines such as urban planning or geology. To further illustrate the interdisciplinary nature of the field, courses in remote sensing and photogrammetry often are offered in departments of geography as well as geology, forestry, or engineering. Undergraduate study provides a general introduction to the field of geography and often includes field study. Research methods and writing skills also are taught. Typical courses offered are physical geography, cultural geography, climatology and meteorology, economic geography, political geography, urban geography, and quantitative methods in geography. Courses in cartography, photogrammetry, remote sensing, historical geography, ecology, natural resource planning, social geography, geography of transportation, geographic aspects of pollution, and geography of various regions also are offered. Geography majors should take appropriate electives in other departments. For example, courses in economics, architecture, urban planning, and urban and rural sociology are important for planners; courses in drawing, design, computer science, and mathematics are important for cartographers; and courses in physics, botany, and geology are important for physical geographers.

In 1978, about 140 institutions offered master's degree programs; 56 offered Ph. D. programs. Applicants for advanced degrees are required to have a bachelor's degree in one of the social or physical sciences with a substantial background in geography. The program of graduate study includes field and laboratory work as well as course work in geography and a thesis. Graduate schools also require course work in advanced mathematics, statistics, and computer science because of the increasing importance of quantitative research methods. A language may be required for those students who plan to specialize in foreign regional geography. In recognition of the increasing importance of applied research, academic programs are putting more emphasis on preparing individuals to apply their knowledge to the solution of practical problems.

Students should select graduate schools that offer appropriate areas of specialization and good research opportunities in nearby libraries, archives, laboratories, and field stations. Internships or part-time employment for graduate students often may be available in government agencies or research, scientific, or industrial firms.

Persons who want to become geographers should enjoy reading, studying, and researching because they must keep abreast of developments in the field. Creativity and intellectual curiosity are important because geographers work with abstract ideas and theories as well as doing practical studies. Patience and persistence help, because geographers spend long hours on independent study and problem solving. They also must be objective and systematic in their work. The ability to communicate ideas effectively, both orally and in writing, is important in this field, as it is in any research-oriented job. The ability to work well with others is often important. Geographers who handle precision drafting tools need manual dexterity.

Employment Outlook

Employment of geographers is expected to grow about as fast as the average for all occupations through the 1980's. Most openings are likely to result from deaths, retirements, and other separations from the labor force.

Little or no employment growth is anticipated in colleges and universities, the traditional employer of many highly qualified geographers; as a result, many such geographers are expected to seek nonacademic positions. Many opportunities are becoming available in urban and environmental management and planning, including such areas as location analysis, land and water resources planning, and health planning. Those with strong backgrounds in urban, economic, and physical geography and in quantitative techniques should be in particular demand. Significant demand also is expected for graduates with knowledge of remote sensing, photogrammetry, and cartography. The Federal Government will need additional personnel to work in programs such as health planning, regional development, environmental quality, and intelligence. Employment of geographers in State and local government is expected to expand, particularly in health planning; conservation; environmental quality; highway planning; and city, community, and regional planning and development. Private industry is expected to hire increasing numbers of geographers for market research and location analysis.

The employment outlook for geographers with the Ph. D. is expected to be favorable through the 1980's for research and administrative positions in government, industry, research organizations, and environmental and other consulting firms. Ph. D.'s may face competition for academic positions, although those graduating from high-ranking universities may have an advantage. Some are likely to accept temporary assignments with little or no hope of acquiring tenure. Those with the master's degree are likely to face competition for academic positions, although some may continue to find jobs in junior and community colleges. Graduates with a master's degree who have training in applied areas should have good opportunities for planning and marketing positions in government and industry; others may face competition.

Graduates with a bachelor's degree are expected to face strong competition for jobs as geographers. Those with quantitative skills and training in cartography, remote sensing, or planning should have the best prospects. Many of these degree holders may find employment in government and industry as management or sales trainees, research assistants, or administrative assistants. Others may obtain employment as research or teaching assistants in educational institutions while studying for advanced degrees. Some bachelor's degree holders teach at the high school level, although in some States the master's degree is becoming essential for high school teaching positions. Others earn library science degrees and become map librarians.

Earnings

According to the 1977-78 College Placement Council Salary Survey, bachelor's degree candidates in the social sciences received offers averaging around $10,700 a year; master's degree candidates in the social sciences, around $13,200.

According to an Association of American Geographers survey, starting salaries for Ph. D.'s with no teaching experience averaged around $14,000 for the academic year 1977-78, while the average salary of geographers employed in colleges and universities was about $21,000. Salaries of geographers in planning positions in business and industry are comparable to those in the Federal Government.

Geographers in educational institutions usually have an opportunity to earn income from other sources, such as consulting work, special research, and publication of books and articles.

The Federal Government recognizes education and experience in certifying applicants for entry level positions. In general, geogra-

phers in the Federal Government with the bachelor's degree and no experience started at $10,507 or $13,014 a year in 1979, depending on their college achievement. Those with a master's degree started at $15,920 a year, and those with the Ph. D. at $19,263. Geographers in the Federal Government averaged around $23,200 a year in 1978; cartographers, around $22,800.

Related Occupations

Knowledge of physical and environmental science is important to geographers. Others whose work requires training in these fields include engineers, geologists, geophysicists, meteorologists, oceanographers, astronomers, chemists, physicists, surveyors, and drafters.

Sources of Additional Information

For additional information on careers and job openings for geographers, and on schools offering various programs in geography, contact:

Association of American Geographers, 1710 16th St. NW., Washington, D.C. 20009.

For additional information on careers in cartography, surveying, and geodesy, contact:

American Congress on Surveying and Mapping, 210 Little Falls St., Falls Church, Va. 22046.

For more information on careers and a list of schools that offer courses in photogrammetry and remote sensing, contact:

American Society of Photogrammetry, 105 North Virginia Ave., Falls Church, Va. 22046.

Geologists

(D.O.T. 024.081 -018, -022, -038, -046, and -054)

Nature of the Work

Geologists study the structure, composition, and history of the earth's crust. By examining surface rocks and drilling to recover rock cores, they determine the types and distribution of rocks beneath the earth's surface. They also identify rocks and minerals, conduct geological surveys, draw maps, take measurements, and record data. Geological research helps to determine the structure and history of the earth and may result in significant advances, such as the ability to predict earthquakes. An important application of geologists' work is locating oil and other minerals.

Geologists use many tools and instruments such as hammers, chisels, levels, transits (mounted telescopes used to measure angles), gravity meters, cameras, compasses, and seismographs (instruments that record the intensity and duration of earthquakes and earth tremors). They may evaluate information from photographs taken from aircraft and satellites and use computers to record and analyze data.

Geologist collects rock samples at the edge of an open-pit mine.

Geologists also examine chemical and physical properties of specimens in laboratories under controlled temperature and pressure. They may study fossil remains of animal and plant life or experiment with the flow of water and oil through rocks. Laboratory equipment used by geologists includes complex instruments, such as the X-ray diffractometer, which determines the structure of minerals, and the petrographic microscope, used for close study of rock formations.

Besides locating resources and working in laboratories, geologists also advise construction companies and governmental agencies on the suitability of certain locations for constructing buildings, dams, or highways. Some geologists administer and manage research and exploration programs. Others teach and work on research projects in colleges and universities.

Geologists usually specialize in one or a combination of three general areas—earth materials, earth processes, and earth history.

Economic geologists locate earth materials such as minerals and solid fuels. *Petroleum geologists* attempt to locate oil and natural gas deposits below the earth's surface. Some petroleum geologists work on specific drilling projects, while others develop petroleum-related geologic information for entire regions. *Engineering geologists* determine suitable sites for the construction of roads, airfields, tunnels, dams, and other structures. They decide, for example, whether underground rocks will bear the weight of a building or whether a proposed structure may be in an earthquake-prone area. *Mineralogists* analyze and classify minerals and precious stones according to composition and structure. *Geochemists* study the chemical composition and changes in minerals and rocks to understand the distribution and migration of elements in the earth's crust.

Geologists concerned with earth processes study landforms and their rock masses, sedimentary deposits (matter deposited by water or wind), and eruptive forces, such as volcanoes. *Volcanologists* study active and inactive volcanoes, lava flows and other eruptive activity. *Geomorphologists* examine landforms and those forces, such as erosion and glaciation, which cause them to change.

Other geologists are primarily concerned with earth history. *Paleontologists* study plant and animal fossils found in geological formations to trace the evolution and development of past life. *Geochronologists* determine the age of rocks and landforms by the radioactive decay of their elements. *Stratigraphers* study the distribution and arrangement of sedimentary rock layers by examining their fossil and mineral content.

Many geologists specialize in new fields that require knowledge of another science as well. *Astrogeologist* study geological conditions on other plants. *Geologial oceanographers* study the sedimentary and other rock on the ocean floor and continental shelf. (See statements on oceanographers and mining elsewhere in the *Handbook*.)

Working Conditions

Conditions of work vary. Exploration geologists often work overseas. Geologists often travel to remote sites by helicopter or jeep and cover large areas by foot, often working in teams. Geologists in mining sometimes work underground. When not working outdoors, geologists are in comfortable, well-lighted, well-ventilated offices and laboratories.

Places of Employment

About 31,000 people worked as geologists in 1978. More than three-fifths of all geologists work in private industry. Most industrial geologists work for petroleum companies; geologists also work for mining and quarrying companies. (See the statements on the mining and petroleum industries elsewhere in the *Handbook*.) Some are employed by construction firms. Others are independent consultants to industry and government.

The Federal Government employed over 2,000 geologists in 1978. Two-thirds worked for the Department of the Interior in the U.S. Geological Survey, the Bureau of Mines, and the Bureau of Reclamation. State agencies also employ geologists, some working on surveys in cooperation with the U.S. Geological Survey.

Colleges and universities employed about 10,400 geologists. Some worked for nonprofit research institutions and museums.

Employment of geologists is concentrated in those States with large oil and mineral deposits. Almost two-thirds work in five States: Texas, California, Louisiana, Colorado, and Oklahoma. Some are employed by American firms overseas for varying periods of time.

Training, Other Qualifications, and Advancement

A bachelor's degree in geology or a related field is adequate for entry into some geology jobs. An advanced degree is helpful for promotion in most types of work and is essential for college teaching and many research positions.

About 350 colleges and universities offer a bachelor's degree in geology. Undergraduate students devote about one-fourth of their time to geology courses, including physical, structural, and historical geology, mineralogy, petrology, and invertebrate paleontology; about one-third of their time to courses in mathematics, related sciences—such as physics and chemistry—and engineering; and the remainder to general academic subjects.

More than 150 universities award advanced degrees in geology. Graduate students take advanced courses in geology and specialize in one branch of the science.

Students planning careers in exploration geology should like the outdoors and must have physical stamina.

Geologists usually begin their careers in field exploration or as research assistants in laboratories. With experience, they can be promoted to project leader, program manager, or other management and research positions.

Employment Outlook

Employment opportunities in geology are expected to be good for those with degrees in geology. The employment of geologists is expected to grow faster than the average for all occupations through the 1980's. This growth will create many new openings each year. Many additional openings will be created each year by geologists who retire, die, or leave the occupation.

Increased prices for petroleum and the necessity to locate new sources of minerals, as older sources become exhausted, will stimulate domestic exploration activities and require many additional geologists. Additional geologists also will be needed to discover new resources and their potential uses. For example, geologists will help determine the feasibility of using geothermal energy (steam from the earth's interior) to generate electricity. Geologists are needed to devise techniques for exploring deeper within the earth's crust and to develop more efficient methods of mining resources. They also are needed to develop adequate water supplies and waste disposal methods, and to do site evaluation for construction activities.

Earnings

Geologists have relatively high salaries, with average earnings over twice those of nonsupervisory workers in private industry, except farming.

According to a survey done by the College Placement Council in early 1979, graduates with bachelor's degrees in other physical and earth sciences received average starting offers of $15,400 a year. Graduates with master's degrees in geology and related geological sciences received average starting offers of $19,000 per year.

In the Federal Government in 1979, geologists having a bachelor's degree could begin at $10,507 or $13,014 a year, depending on their college records. Those having a master's degree could start at $13,014 or $15,920 a year; those having the Ph. D. degree, at $19,263 or $23,087. In 1978, the average salary for geologists employed in the Federal Government was about $26,500 a year.

Related Occupaions

Over one-half of all nonacademic geologists work in the petroleum and natural gas industry. This industry also employs many other workers who are involved in the scientific and technical aspects of petroleum and natural gas exploration and extraction, including drafters, engineering technicians, geophysicists, laboratory assistants (petroleum production), petroleum engineers, and surveyors.

Sources of Additional Information

General information on training and career opportunities for geologists is available from:

American Geological Institute, 5205 Leesburg Pike, Falls Church, Va. 22041.

For information on Federal Government careers, contact:

U.S. Office of Personnel Management, 1900 E St. NW., Washington, D.C. 20415.

Geophysicists

(D.O.T. 024.061-030)

Nature of the Work

Geophysicists study the composition and physical aspects of the earth and its electric, magnetic, and gravitational fields. Geophysicists use highly complex instruments such as the magnetometer which measures variations in the earth's magnetic field, and the gravimeter which measures minute variations in gravitational attraction. They often use satellites to conduct tests from outer space and computers to collect and analyze data.

Geophysicists usually specialize in 1 of 3 general phases of the science—solid earth, fluid earth, and upper atmosphere. Some may also study other planets.

Solid earth geophysicists search for oil and mineral deposits, map the earth's surface, and study earthquakes. *Exploration geophysicists* use seismic prospecting techniques to locate oil and mineral deposits. They send sound waves into the earth and record the echoes bouncing off the rock layers below to determine if conditions are favorable for the accumulation of oil.

Seismologists study the earth's interior and vibrations caused by earthquakes and man-made explosions. They explore for oil and minerals, study how to detect underground nuclear explosions, and provide information for constructing bridges, dams, and buildings. For example, in selecting a site for a dam, seismologists determine where bedrock (solid rock beneath the soil) is closest to the surface. They use explosives or other methods to create sound waves that reflect off bedrock; the time it takes for the shock wave to return to the surface indicates the depth of bedrock. Seismologists also seek to understand the causes of earthquakes so that one day they might be predicted.

Geodesists study the size, shape, and gravitational field of the earth and other planets. Their principal task is to make the precise measurements necessary for accurate mapping of the earth's surface. With the aid of satellites, geodesists determine the positions, elevations, and distances between points on the earth, and measure the intensity and direction of gravitational attraction.

Hydrologists study the distribution, circulation, and physical properties of underground and surface waters, including rivers, glaciers, snow, and permafrost. They also may study rainfall, its rate of infiltration into soil, and its return to the ocean. Some are concerned with water supplies, irrigation, flood control, and soil erosion. (See the statement on oceanographers, sometimes classified as geophysical scientists, elsewhere in the *Handbook*.)

Geophysicist analyzes data obtained from earlier studies.

Geophysicists also study the atmosphere, investigate the earth's magnetic and electric fields, and compare its outer atmosphere with those of other planets. *Geomagneticians* study the earth's magnetic field. *Paleomagneticians* learn about past magnetic fields from rocks or lava flows. *Planetologists* study the composition and atmosphere of the moon, planets, and other bodies in the solar system. They gather data from geophysical instruments placed on interplanetary space probes or from equipment used by astronauts during the Apollo missions. *Meteorologists* sometimes are classified as geophysical scientists. (See the statement on meteorologists elsewhere in the *Handbook*.)

Working Conditions

Many geophysicists work outdoors and travel for extended periods of time. Some work at research stations in remote areas, or aboard ships and aircraft equipped with sophisticated geophysical equipment. When not in the field, geophysicists work in modern, well-equipped, well-lighted laboratories and offices.

Places of Employment

About 11,000 people worked as geophysicists in 1978. Most work in private industry, chiefly for petroleum and natural gas companies. (See the chapter on the mining and petroleum industry elsewhere in the *Handbook.)* Others are in mining companies, exploration and consulting firms, and research institutes. A few are independent consultants and some do geophysical prospecting on a fee or contract basis.

Geophysicists are employed in many southwestern and western States, and on the Gulf Coast, where large oil and natural gas fields are located. Some geophysicists are employed by American firms overseas for varying periods of time.

Over 2,500 geophysicists, geodesists, and hydrologists worked for Federal Government agencies in 1978, mainly the U.S. Geological Survey, the National Oceanic and Atmospheric Administration (NOAA), and the Defense Department. Other geophysicists work for colleges and universities, State governments, and nonprofit research institutions.

Training, Other Qualifications, and Advancement

A bachelor's degree in geophysics or a geophysical specialty is sufficient for most beginning jobs in geophysics. A bachelor's degree in a related field of science or engineering also is adequate preparation, if the person has courses in geophysics, physics, geology, mathematics, chemistry, and engineering.

Geophysicists doing research or supervising exploration activities should have graduate training in geophysics or a related science. Those planning to teach in colleges or do basic research should acquire a Ph. D. degree.

About 40 colleges and universities award the bachelor's degree in geophysics. Other programs offering training for beginning geophysicists include geophysical technology, geophysical engineering, engineering geology, petroleum geology, and geodesy.

About 30 universities grant the master's and Ph. D. degree in geophysics. Candidates with a bachelor's degree which includes courses in geology, mathematics, physics, engineering, or a combination of these subjects can be admitted.

Geophysicists often work as part of a team. They should be curious, analytical, and able to communicate effectively.

Most new geophysicists begin their careers doing field mapping or exploration. Some assist senior geophysicists in research laboratories. With experience, geophysicists can advance to jobs such as project leader or program manager, or other management and research jobs.

Employment Outlook

Employment opportunities are expected to be very good for graduates with a degree in geophysics or a related field. Although few openings are expected in this relatively small field, the number of qualified people may fall short of requirements if the present trend in the number obtaining geophysics training continues.

Employment of geophysicists is expected to grow faster than the average for all occupations through the 1980's. As known deposits of petroleum and other minerals are depleted, petroleum and mining companies will need increasing numbers of geophysicists who can use sophisticated electronic techniques to find less accessible fuel and mineral deposits.

In addition, geophysicists with advanced training will be needed to do research on radioactivity and cosmic and solar radiation and to investigate the use of geothermal power (steam from the earth's interior) as a source of energy to generate electricity.

Federal agencies are expected to hire more geophysicists for new and expanding programs. Through the 1980's, jobs will depend heavily on funds for research and development in earth sciences as the Government supports energy research in both established and alternative sources. The Government also may fund research to locate more natural resources and to prevent environmental damage through better land use.

Earnings

Geophysicists have relatively high salaries, with average earnings more than twice those of nonsupervisory workers in private industry, except farming.

According to a survey done by the College Placement Council in early 1979, graduates with bachelor's degrees in other physical and earth sciences received average starting offers of $15,400 a year. Graduates with master's degrees in geology and related geological sciences received average starting offers of $19,000 per year.

In the Federal Government in 1979, geophysicists having a bachelor's degree could begin at $10,507 or $13,014 a year, depending on their college records. Geophysicists having a master's degree could start at $13,014 or $15,920 a year; those having a Ph. D. degree, at $19,263 or $23,087. In 1978, the average salary for geophysicists employed by the Federal Government was about $27,600 a year.

Related Occupations

Geophysicists investigate and use basic scientific principles about the nature and composition of the earth. Other scientists engaged in similar activities are chemists, geologists, meteorologists, and oceanographers.

Sources of Additional Information

General information on career opportunities, training, and earnings for geophysicists is available from:

American Geophysical Union, 2000 Florida Ave. NW., Washington, D.C. 20009.

Society of Exploration Geophysicists, P.O. Box 3098, Tulsa, Okla. 74101.

For information on Federal Government careers, contact:

U.S. Office of Personnel Management, 1900 E St. NW., Washington, D.C. 20415.

Health and Regulatory Inspectors (Government)

(D.O.T. 168.167-010, -022, and -062; .264-010; .267-018 and -022; .267-042 through -066, -074, and -078; and .287)

Nature of the Work

Protecting the public from health and safety hazards, prohibiting unfair trade and employment practices, and raising revenue are included in the wide range of responsibilities of government. Health and regulatory inspectors help insure observance of the laws and regulations that govern these responsibilities. For discussion of a third type of inspector, see the statement on construction inspectors (Government) elsewhere in the *Handbook*.

The duties, titles, and responsibilities of Federal, State, and local health and regulatory inspectors vary widely. Some types of inspectors work only for the Federal Government while others also are employed by State and local governments. Many accountants, agricultural cooperative extension service workers, and other agricultural professionals also have inspection duties.

Health Inspectors. Health inspectors work with engineers, chemists, microbiologists, and health workers to insure compliance with public health and safety regulations governing food, drugs, and various other consumer products. They also administer regulations that govern the quarantine of persons and products entering the United States from foreign countries. The major types of health inspectors are: consumer safety, food, agricultural quarantine, and environmental health inspectors. In addition, some inspectors work in a field that is closely related to food inspection—agricultural commodity grading.

Most *consumer safety inspectors* specialize in one area of inspection such as food, feeds and pesticides, weights and measures, or drugs and cosmetics. Some, especially those who work for the Federal Government, may be proficient in several of these areas. Working individually or in teams under the direction of a senior or supervisory inspector, they periodically check firms that produce, handle, store, and market food, drugs, and cosmetics. They look for evidence of inaccurate product labeling, decomposition, chemical or bacteriological contamination, and other factors that could result in a product becoming harmful to health. They assemble evidence of violations, using portable scales, cameras, ultraviolet lights, container sampling devices, thermometers, chemical testing kits, and other types of equipment.

Product samples collected as part of their examinations are sent to laboratories for analysis. After completing their inspection, inspectors discuss their observations with the management of the plant and point out any areas where corrective measures are needed. They prepare written reports of their findings, and, when necessary, compile evidence that may be used in court if legal actions must be taken to effect compliance with the law.

Federal and State laws empower *food inspectors* to inspect meat, poultry, and their byproducts to insure that they are wholesome and safe for public consumption. Working as part of a constant onsite team under the general supervision of a veterinarian, they inspect meat and poultry slaughtering, processing, and packaging operations. They also check to see that products are labeled correctly and that proper sanitation is maintained in slaughtering and processing operations.

Agricultural quarantine inspectors protect American agricultural products from the introduction and spread of foreign plant pests and animal diseases. To safeguard crops, forests, and gardens, they inspect ships, aircraft, railroad cars, and motor vehicles entering the United States for the presence of restricted or prohibited plant or animal materials.

Environmental health inspectors, or sanitarians, work primarily for State and local governments. These inspectors perform a variety of inspection duties to help insure that food water, and air meet government standards. They check the cleanliness and safety of food and beverages produced in dairies and processing plants, or served in restaurants, hospitals, and other institutions. They often examine the handling, processing, and serving of food for compliance with sanitation rules and regulations.

Consumer safety inspectors check food for evidence of inaccurate labeling, decomposition, or contamination.

Environmental health inspectors concerned with waste control oversee the treatment and disposal of sewage, refuse, and garbage. They examine places where pollution is a danger, perform tests to detect pollutants, and collect air or water samples for analysis. They determine the nature and cause of the pollution, then initiate action to stop it.

In large local and State health or agriculture departments, environmental health inspectors may specialize in areas of work such as milk and dairy products, food sanitation, waste control, air pollution, institutional sanitation, and occupational health. In rural areas and small cities, they may be responsible for a wide range of environmental health activities.

Agricultural commodity graders apply quality standards to various commodities to insure that retailers and consumers receive good and reliable products. They generally specialize in an area such as eggs and egg products, processed or fresh fruits and vegetables, grain, or dairy products. They inspect samples of a particular product to determine its quality and grade, and issue official grading certificates. Graders also may inspect the plant and equipment to insure that adequate sanitation standards are maintained.

Regulatory Inspectors. Regulatory inspectors insure compliance with various laws and regulations that protect the public welfare. Important types of regulatory inspectors are: Immigration; customs; air safety; mine; wage-hour compliance; and alcohol, tobacco, and firearms inspectors.

Immigration inspectors interview and examine people seeking admission, readmission, or the privileges of passing through or residing in the United States. They inspect the passports of those seeking to enter the United States to determine whether they are legally eligible to enter and to verify their citizenship, status, and identity. Immigration inspectors also prepare reports, maintain records, and process applications and petitions by aliens for privileges such as immigrating to or living temporarily in the United States.

Customs inspectors enforce the laws governing U.S. imports and exports. Stationed at airports, seaports, and border crossing points, they count, weigh, gauge, measure, and sample commercial cargoes entering and leaving the United States to determine the amount of tax that must be paid. They also inspect baggage and articles worn or carried by the passengers and crew of ships, aircraft, and motor vehicles to insure that all merchandise being brought through ports of entry is declared and the proper taxes paid.

Air safety inspectors insure that Federal Aviation Administration (FAA) regulations that govern the quality and safety of aircraft equipment and personnel are maintained. Air safety inspectors may inspect aircraft manufacturing, maintenance, or operations procedures. They usually specialize in inspecting either commercial or general aviation aircraft. They are responsible for the inspection of aircraft manufacturing and of major repairs. They also certify aircraft pilots and schools, pilot examiners, flight instructors, and instructional materials.

Mine inspectors work to insure the health and safety of miners and to promote good mining practices. To insure compliance with safety laws and regulations, mine inspectors visit mines and related facilities to obtain information on health and safety conditions.

Mine inspectors discuss their findings with the management of the mine, prepare written reports that incorporate their findings and decisions, and issue notices of findings that describe violations and hazards that must be corrected. They also investigate and prepare reports on mine accidents and direct rescue and firefighting operations when fires or explosions occur.

Wage-hour compliance inspectors inspect the employer's time, payroll, and personnel records to insure compliance with the provisions of various Federal laws on minimum wages, overtime, pay, employment of minors, and equal employment opportunity. They often interview employees to verify the employer's records and to check for any complaints.

Alcohol, tobacco, and firearms inspectors insure that the industries which manufacture these products comply with the provisions of revenue laws and other regulations on operating procedures, unfair competition, and trade practices. They spend most of their time inspecting distilleries, wineries, and breweries; cigar and cigarette manufacturing plants; wholesale liquor dealers and importers; firearms and explosives manufacturers, dealers, and users; and other regulated facilities. They periodically audit these establishments to determine that appropriate taxes are correctly determined and paid.

Working Conditions

Most health and regulatory inspectors live an active life, meeting many people and working in a variety of environments. Many travel frequently and are usually furnished with an automobile or reimbursed for travel expenses.

At times, inspectors have unfavorable working conditions. For example, food, and alcohol, tobacco, and firearms inspectors frequently come in contact with strong, unpleasant odors. Mine inspectors often spend a great deal of time in mines where they are exposed to the same hazards as miners. Many inspectors work long and often irregular hours.

Places of Employment

About 100,000 persons worked as health and regulatory inspectors in 1978. Nearly two-thirds of all health and regulatory inspectors work for the Federal Government, although State and local governments also employ large numbers. The largest single employer of consumer safety inspectors is the U.S. Food and Drug Administration, but the majority work for State governments. Food inspectors and agricultural commodity graders who work in processing plants are employed mainly by the U.S. Department of Agriculture. Agricultural quarantine inspectors work either for the U.S. Public Health Service or the U.S. Department of Agriculture. Environmental health inspectors work primarily for State and local governments.

Regulatory inspectors work for various agencies within the Federal Government, mainly in regional and district offices throughout the United States. Air safety inspectors work for the Federal Aviation Administration; wage-hour compliance officers and mine inspectors, for the Department of Labor; and alcohol, tobacco, and firearms inspectors, for the Treasury Department. Immigration, customs, and agricultural quarantine inspectors work at U.S. airports, seaports, border crossing points, and at foreign airports and seaports. They are employed by the Justice and Treasury Departments.

Training, Advancement, and Other Qualifications

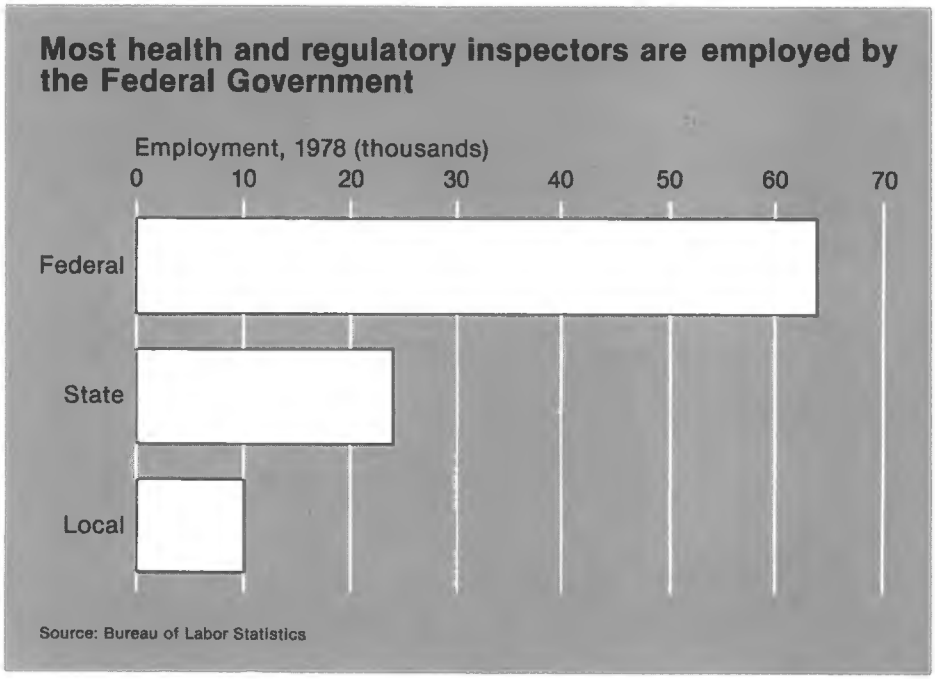
Because inspectors perform such a wide range of duties, qualifications for employment vary greatly. The Federal Government requires a passing score on the Professional and Administrative Career Examination (PACE) for several inspector occupations, including immigration; customs; wage-hour compliance; alcohol, tobacco, and firearms; occupational safety; and consumer safety inspectors. To take this examination, a bachelor's degree or 3 years of responsible work experience, or a combination of the two, are required. In most cases, agencies will give preference to an applicant whose course work or experience is related to the field of employment.

Food inspectors must pass an examination based on specialized knowledge, in addition to having experience in related fields.

Air safety inspectors must have considerable experience in aviation maintenance, and an FAA Air Frame and Power Plant certificate. In addition, various pilot certificates and considerable flight experience are required, with the type dependent on the inspection duties. Many air safety inspectors receive both flight training and mechanical training in the Armed Forces. No written examination is required.

Applicants for mine safety inspector positions generally must have specialized work experience in mine safety, management, or supervision, or possess a skill such as electrical engineering (for mine electrical inspectors). In some cases, a general aptitude test may be required.

Some Civil Service registers, including those for agricultural quarantine inspectors and agricultural commodity graders, rate applicants solely on their experience and education and require no written examination.



Qualifications for inspectors at the State and local level usually are similar to those for Federal employees. However, this may vary among government employers, particularly at the local level. Environmental health inspectors, called sanitarians in many States, usually must have a bachelor's degree in environmental health or the physical or biological sciences. In 35 States, they are licensed and their qualifications regulated by examining boards.

All inspectors are trained in the laws and inspection procedures related to their specific field through a combination of classroom and on-the-job training. In general, people who want to become health and regulatory inspectors should be able to accept responsibility and like detailed work. They should be neat and personable and able to express themselves well orally and in writing.

All Federal Government inspectors are promoted on a Civil Service "career ladder." This means that, assuming satisfactory work performance, workers will advance automatically, usually at 1-year intervals, to a specified maximum level. Above this level (usually supervisory positions), advancement is competitive, based on needs of the agency and individual merit.

Employment Outlook

Employment of health and regulatory inspectors as a group is expected to increase about as fast as the average for all occupations through the 1980's. The growth in employment of health and regulatory inspectors is expected to be rapid at the Federal and local levels. In addition to job opportunities stemming from growth in the need for inspectors, many inspectors will be needed each year to replace those who die, retire, or transfer to other occupations.

Increased food consumption caused by population growth and greater public concern over potential health hazards should create additional jobs for food, consumer safety, and environment health inspectors, as well as for agricultural commodity graders. Public concern for improved quality and safety of consumer products also may result in new legislation in these areas, requiring additional inspectors to insure compliance.

Aviation industry growth, increased international travel, and increases in the volume of U.S. imports and exports should continue to create new openings for air safety, agricultural quarantine and immigration inspectors, and customs inspectors. Increasing coal mining activity and concern over mine safety should create additional mine inspector jobs. Continued public pressure for equal employment rights should cause a growing need for wage-hour compliance officers.

Earnings

With the exception of mine inspectors and aviation safety officers, the Federal Government paid health and regulatory inspectors and graders starting salaries of $10,507 or $13,014 a year in 1979, depending on the type of position and the qualifications of the applicant. Aviation safety officers and mining inspectors usually received starting salaries of $15,920.

Salaries of experienced food inspectors, agricultural guarantine inspectors, alcohol, tobacco, and firearms inspectors, and customs and immigration inspectors were over $16,000 a year in 1979. Experienced consumer safety inspectors, mine inspectors, and wage-hour compliance officers usually received salaries of more than $20,000 from the Federal Government in 1979. Experienced aviation safety officers averaged over $23,000 a year.

Nonsupervisory environmental health inspectors working for selected U.S. cities and counties received average starting salaries of about $12,500 in 1978; those working for State governments started at about $1,500 less. Experienced environmental health inspectors working for State governments earned between $12,700 and $16,800 but those in top supervisory and administrative positions had salaries between $18,200 and $24,300 in 1978.

Related Occupations

Health and regulatory inspectors are responsible for seeing that government laws and regulations are obeyed. Related occupations with similar law enforcement responsibilities include bank examiners, revenue agents, construction inspectors, State and local police officers, and fish and game wardens.

Sources of Additional Information

Information on inspector careers in the Federal Government is available from State employment service offices or from U.S. Office of Personnel Management area offices or Federal Job Information Centers located in various large cities throughout the country. For information on a career as a specific type of inspector, the Federal department or agency that employs them may also be contacted directly.

Information about career opportunities as inspectors in State and local governments is available from State civil service commissions, usually located in each State capital, or from local government offices.

Health Services Administrators

(D.O.T. 169.167-010; 187.117-010, -018, -050; 187.167-034, -090; 188.117-082)

Nature of the Work

Medical and health care is provided by organizations that vary from large teaching hospitals to small walk-in clinics. To function properly, each of these requires effective management which health administrators provide under the general supervision of a board of directors or other governing body.

Administrators direct the various functions and activities that make a health organization work. They may do this personally, where the organization is small, or direct a staff of assistant administrators in larger organizations. Health administrators make many kinds of management decisions. For example, they may review budget proposals, make personnel decisions, and negotiate for the expansion of facilities.

Some health services administrators, including those who manage hospitals or nursing homes, oversee nursing, food services, and in-service training programs. Assistant administrators usually direct the daily operations of these departments; however, the chief executive keeps informed through for-

mal and informal meetings with the assistants, the medical staff, and others. In addition to these management activities, many health administrators help carry out fundraising drives and promote public participation in health programs. This phase of the administrator's job often includes speaking before civic groups, arranging publicity, and coordinating the activities of the organization with those of government or community agencies.

Working Conditions

Health administrators often work long hours. Health facilities such as nursing homes and hospitals operate around the clock, and administrators may be called at all hours to settle emergency problems. Also, some may travel to meetings or, for these who oversee several facilities, to make inspections.

Places of Employment

About 180,000 persons worked in some phase of health administrationin 1978. Most administrators work in health facilities, including hospitals (which employed about half of all administrators), nursing and personal care homes, and health management firms that provide administrative services for a fee.

Some health administrators work for government agencies, including State and local health departments and the U.S. Public Health Service. In addition, the Federal Government hires administrators in Veterans Administration and Armed Forces hospitals and clinics. Others work for voluntary health agencies that support research, provide care and treatment for victims of particular diseases or impairments and conduct professional and public education and communitee service programs.

Training, Other Qualifications, and Advancement

Educational requirements for health services administrators vary according to the position's level of responsibility and the size of the organization. Generally, larger organizations with a more complicated administrative structure require higher credentials than smaller ones.

Applicants with master's degrees in health or hospital administration may be hired as associate or assistant administrators in hospitals, while those with master's degrees in public health often find work as program analysts or program representatives in public health departments. Very few master's degree recipients take entry positions in nursing or personal care homes, although many nursing home administrators pursue graduate education while employed. New master's degree graduates from programs in related disciplines such as public administration or management are sometimes hired for administrative jobs. Master of business administration (MBA) graduates, for example, are sometimes hired by public health departments as program analysts.

Bachelor's degree recipients usually begin their careers as administrative assistants or department heads in hospitals, or as assistant administrators in nursing homes. Graduates of 2-year, associate degree programs generally are hired as unit directors or assistant department heads in hospitals, or as assistants to program representatives in public health departments. Some associate degree holders find assistant administrator jobs in small nursing homes.

The Ph. D. degree usually is required for positions in teaching or research, and is an asset for those seeking administrative jobs in larger, more prestigious health organizations. Although some public health departments still require chief administrators to be physicians, the trend is away from this.

Administrators in Armed Forces hospitals usually are career military personnel.

In 1978, about 60 bachelor degree programs in health services administration were offered. In addition, there were over 75 master's degree, programs in hospital or health services administration that led to the master's degree, and 22 master's degree programs in schools of public health.

To enter graduate programs, applicants must have a bachelor's degree, with courses in natural sciences, psychology, sociology, statistics, accounting, and economics. Competition for entry to these programs is keen, and applicants need above- average grades to gain admission. The programs generally last about 2 years and may include some supervised administrative experience in hospitals, clinics, or health agencies. Programs may include courses such as hospital organization and management, accounting and budget control, personnel administration, public health administration, and the economics of health care.

All States and the District of Columbia require that the administrator of a nursing or personal care home be licensed. Requirements are not uniform, but they generally specify a level of education, such as a bachelor's degree, plus some amount of experience in the field.

Personal qualifications needed for success as a health administrator include initiative and an interest in helping the sick, injured and handicapped. Administrators should be able to work with and motivate people, and to organize and direct large-scale activities. They also should enjoy public speaking.

Health administrators advance in the profession by taking increasingly more responsible positions. Most frequently, the first job is in a large institution in a position that is somewhat narrow in scope—for example, as department head in charge of purchasing. Advancement is then to successively more responsible jobs such as assistant or associate administrator and finally the chief administrator. Less commonly, hospital administrators begin their careers in small hospitals in positions with broad responsiblities, such as assistant administrator. Regardless of the path of advancement chosen, the ultimate occupational goal in hospitals and nursing homes is chief executive or chief administrative officer.

Some health services administrators work in nursing homes.

Employment Outlook

The number of graduate programs in health administration has increased rapidly in recent years; in addition, administative specialists with graduate degrees in other fields have entered the profession. Conse-

quently, it may become more difficult for those with less than a graduate education to enter health administration in top management positions. In addition, some administrative jobs will continue to be filled by registered nurses, physicians, and members of religious communities.

Employment of health services administrators is expected to grow much faster than the average for all occupations through the 1980's as the quantity of patient services increases and health services management becomes more complex. The demand for administrators will be stimulated by the formation of more group medical practices and health maintenance organizations (facilities that offer subscribers a broad range of medical services for a set fee). Administrators also will be needed in nursing and convalescent homes to handle the increasing amount of administrative work expected as these facilities expand in size.

Earnings

Salaries of hospital administrators depend on factors such as the level of job responsibility; the size, type, and location of the hospital; and the size of its administrative staff and budget.

Chief administrators in hospitals with 100 to 150 beds earned an average of $36,000 a year in 1978. Some, in larger hospitals, earned over $55,000. Recent recipients of master's degrees in health administration starting work in Veterans' Administration (VA) hospitals earned $15,920 a year in 1979. The average salary paid administrators of Federal hospitals was $32,100.

Commissioned officers in the Armed Forces who work as hospital administrators hold ranks ranging from second lieutenant to colonel or from ensign to captain. Commanding officers of large Armed Forces hospitals are generally physicians, who may hold higher ranks. Hospital administrators in the U.S. Public Health Service are commissioned officers holding ranks equivalent to those of lieutenant (junior grade) through captain in the Navy.

Administrators of nursing and personal care homes usually earn lower salaries than those paid hospital administrators in facilities having similar numbers of beds. Average annual earnings of nursing home administrators in 1978 were about $21,500. Most administrators employed by voluntary health agencies earned between $20,000 and $30,000 a year in 1978.

Related Occupations

Health services administrators plan programs, set policies, and make decisions for a health service agency or institution. Other administrators with similar responsibilities include social welfare administrators, business enterprise officers, community organization directors, curators, college or university department heads, medical-record administrators, recreation superintendents.

Sources of Additional Information

Information about health administration and the academic programs in this field offered by universities, colleges, and community colleges is available from:

American College of Hospital Administration, 840 North Lake Shore Drive, Chicago, Ill. 60611.

Association of University Programs in Health Administration, One Dupont Circle, NW., Washington, D.C. 20036.

National Health Council, Health Careers Program, 1740 Broadway, New York, N.Y. 10019.

American College of Nursing Home Administrators, 4650 East-West Hwy., Washington, D.C. 20014.

Historians

(D.O.T. 052; 090.227-010; 101; 102.017-010; and 102.117-010)

Nature of the Work

History is the record of past events, institutions, ideas, and people. Historians describe and analyze the past through writing, teaching, and research. They use standard techniques to locate and evaluate historical evidence. Historians do not accept documents, records, or spoken accounts at face value; they study each piece of evidence carefully to determine whether it is reliable or genuine. Once they have established the validity of historical evidence, historians try to determine the significance of their findings. Sometimes they develop theories to explain the importance of facts and their interrelationships. They may, for example, relate their knowledge of the past to current events in an effort to explain the present.

Historians almost always specialize. Some concentrate on the history of a country or a region; others study a particular period of time—the 20th century, for example. In this country, while many historians specialize in the social or political history of the United States or modern Europe, a growing number concern themselves with African, Latin American, Asian, or Middle Eastern history. Some specialize in the history of a field, such as economics, medicine, philosophy, religion, science, technology, music, art, military affairs, women, or the labor movement. Other fields of specialization are genealogy, biography, rare books and documents, and historic preservation.

Most historians are teachers in colleges or universities. Like other faculty members, they may also lecture, write, and do consulting work. Some historians employed by colleges and universities engage only in research; often, they are leading authorities in their fields. (For more information on these jobs, see the *Handbook* statement on college and university faculty.)

A growing number of historians do many things besides teach, however. *Archivists* and *curators* work for museums, special libraries, or historical societies, where they typically identify, classify, and preserve historical documents, treasures, and other material. They may also administer historical activities—helping scholars use manuscripts and artifacts and educating the public through exhibits and publications. Many do an extensive amount of scholarly research and writing.

Biographers write about the lives of individuals, using diaries, news accounts, personal correspondence, interviews with relatives and business associates of their subjects, and other sources of information. *Genealogists* trace family history, using birth, death, and marriage certificates, court records, wills, records of real estate transactions, and other evidence.

A growing number of historians are concerned with the protection and preservation of historic buildings and sites. Their goal is to identify and interpret our historical heritage, which includes houses, public buildings, factories, churches, forts, public markets, farms, and battlefields. Some historians are employed to manage, interpret, and write about restored communities and other places of historic interest. Historic preservationists also work to save city neighborhoods and old business districts and maintain their unique historic and architectural qualities. This usually means a joint effort with architects, lawyers, urban planners, business and community leaders, and city officials.

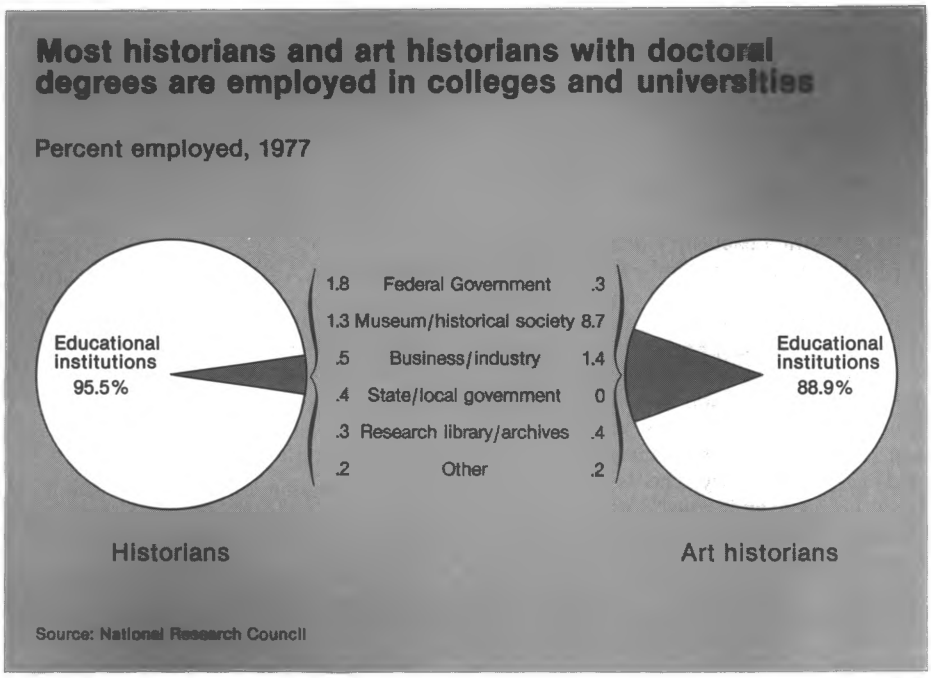
Some historians serve as consultants to editors, publishers, and producers of materials for radio, television, and motion pictures. Others are employed as researchers by government agencies, social science research firms, and other organizations. They might be asked, for example, to assist in the preparation of an environmental impact statement or to provide information for a community development plan.

Working Conditions

Historians employed in colleges and universities have flexible work schedules, dividing their time among teaching, research, and administrative responsibilities. Historians working in government agencies and private firms, on the other hand, have much more structured schedules. They often work alone behind a desk, reading and writing reports on their research. Many experience the pressures of deadlines and tight schedules, and sometimes must work overtime. Their routine may be interrupted by telephone calls, letters, special requests for information, meetings, or conferences. Travel may be necessary to collect information or attend meetings.

Places of Employment

An estimated 23,000 persons worked as professional historians in 1978. Colleges and



universities employed most of them. Historians also work in archives, libraries, museums, research and educational organizations, historical societies, publishing firms, large corporations, and government agencies. Historians, archivists, and museum curators employed in the Federal Government work principally in the National Archives, Smithsonian Institution, General Services Administration, or in the Departments of Defense, Interior, and State. Other Federal employers include the National Aeronautics and Space Administration, Central Intelligence Agency, National Security Agency, and the Departments of Agriculture, Commerce, Education, Energy, and Transportation. A number work for State and local governments.

Training, Other Qualifications, and Advancement

Graduate education usually is necessary for a job in this field. A master's degree in history is the minimum requirement for the position of college instructor. However, a Ph. D. degree is required for a first appointment at some institutions of higher education and for many other entry level positions. A Ph. D. is required for a professorship or a top administrative position, and is necessary to gain tenure. However, tenure is becoming increasingly difficult to acquire.

While historians in the Federal Government generally must have a college degree with 24 semester hours in history, requirements may vary for certain specialists. For example, archivists need a college degree with 18 semester hours in American history or government and 12 additional hours of history, American civilization, economics, political science, or related fields; museum curators need a college degree in museum studies or in an appropriate subject field such as art history or the history of technology. However, because competition for Federal jobs is keen, additional education or experience may be required. Most historians in the Federal Government and in nonprofit organizations have Ph. D. degrees or their equivalent in training and experience.

Although a bachelor's degree with a major in history is sufficient training for some beginning jobs in government—either Federal, State, or local—advancement opportunities may be limited for persons without at least a master's and preferably a Ph. D. degree in history. Since beginning jobs are likely to be concerned with the collection and preservation of historical data, a knowledge of archival work is helpful.

Training for historians is available in many colleges and universities. Over 800 schools offer programs for the bachelor's degree; about 320, the master's; and about 150, the doctorate.

History curriculums in the Nation's colleges and universities are varied; however, each basically provides training in research methods, writing, and speaking. These are the basic skills essential for historians in all positions. Quantitative methods of analysis, including statistical and computer techniques, are increasingly important for historians; most graduate history departments include them. Most doctoral candidates must exhibit competence in at least one foreign language.

A greater emphasis on preparing history students for nonacademic careers is apparent. History departments are offering more courses and programs designed to prepare graduates for museum jobs, archival management, historic editing, historic preservation,

Historians must be thorough in their research before reaching any conclusions.

and applied research. Courses in other applied fields such as public administration or business administration also greatly enhance one's opportunities for nonacademic employment.

Historians spend a great deal of time doing research, writing papers and reports, and giving lectures and presentations. They must possess strong analytical skills in order to evaluate historical evidence and work effectively with abstractions and theories. They must be systematic and objective in their work, since they must consider all relevant facts before reaching a conclusion. Patience and persistence are necessary, because historians spend long hours in independent study. As in other fields of scientific endeavor, the qualities of intellectual curiosity and creativity are essential.

Presenting the results of their research is an important part of a historian's job, so the ability to communicate effectively—both orally and in writing—is a "must." The ability to work with others on joint research projects can be important.

Employment Outlook

Overall, little if any growth is expected in the employment of historians through the 1980's. Replacement needs accordingly will constitute the principal source of jobs. Openings in colleges and universities, museums, research firms, government agencies, and other organizations will occur as workers die, retire, or leave the occupation for other reasons. Persons with computer backgrounds and training in quantitative methods in historical research are expected to have the most favorable job opportunities in business, industry, government, and research firms. Historians with strong backgrounds in historic preservation or other applied disciplines such as public administration or business administration also may be in a relatively favorable position. Of those seeking college faculty jobs, applicants who are qualified to teach several areas of history, such as American history combined with African or Latin American history, should have the best opportunities.

The oversupply of history graduates is expected to continue; throughout the 1980's, the number of persons seeking to enter the occupation will greatly exceed available positions. As a result, historians with a Ph. D. are expected to face very keen competition for positions. Those graduating from prestigious universities may have some advantage in this highly competitive situation. Since academic institutions are the traditional employers of many highly qualified historians and competition for these jobs is expected to be particularly keen, some Ph. D.'s are expected to accept part-time, temporary assignments as instructors with little or no hope of gaining tenure. An increasing number of Ph. D.'s will take research or administrative positions in government, industry, research firms, and other nonacademic institutions.

Persons with the master's degree in history will encounter even more severe competition for jobs as historians. Some may find teaching positions in junior and community colleges, while others may find jobs in government and industry. Those who meet State certification requirements may become secondary school teachers.

People with a bachelor's degree in history are likely to find very limited opportunities for employment as professional historians. However, an undergraduate major in history provides an excellent background for jobs in a number of fields including international relations and journalism, and for continuing education in law, business administration, and related disciplines. Many graduates will find jobs in secondary schools or in government, business, and industry as management or sales trainees, or as research or administrative assistants.

Earnings

According to the 1977-78 College Placement Council Survey, bachelor's degree candidates in the social sciences received offers averaging around $10,700 a year; master's degree candidates in the social sciences, around $13,200.

According to information from the American Historical Association, colleges and universities offered new Ph. D.'s starting salaries ranging from about $12,000 to $14,000 for the academic year 1977-78. Full professors and top administrators earn substantially more.

The American Association for State and Local History conducted a survey of salaries in historical agencies, including museums and other organizations. In 1978, agency heads averaged $20,256; assistant agency heads, $15,912; division heads, $15,864; advanced professionals, $14,496; and beginning professionals, $11,412.

According to a survey by the National Research Council, the 1977 median annual salary of full-time employed Ph. D.'s in history was $21,400; in educational institutions, $21,500. The median annual salary of Ph. D.'s in art history was $19,900; in educational institutions, $19,900; in museums or historical societies, $18,800.

The Federal Government recognizes education and experience in certifying applicants for entry level positions. In general, historians having a bachelor's degree could start at $10,507 or $13,014 a year in 1979, depending upon the applicant's academic record. The starting salary for those having a master's degree was $15,920 a year, and for those having a Ph. D., $19,263. Historians in the Federal Government averaged around $25,800 a year in 1978; museum curators, around $24,800; and archivists, around $22,900.

Many historians, particularly those in college teaching, supplement their income by teaching summer classes, writing books or articles, or giving lectures.

Related Occupations

Historians study past events, institutions, and ideas. Their concern with understanding how societies operate is shared by other workers, including writers, journalists, political scientists, economists, sociologists, anthropologists, geographers, planners, and marketing research workers.

Sources of Additional Information

Additional information on careers and job openings for historians, and on schools offering various programs in history, is available from:

American Historical Association, 400 A St. SE., Washington, D.C. 20003.

For information on careers and schools offering degree programs and courses in historic preservation, contact:

National Trust for Historic Preservation, 1789 Massachusetts Ave.NW., Washington, D.C. 20036.

General information on careers for historians is available from:

Organization of American Historians, Indiana University, 112 North Bryan St., Bloomington, Ind. 47401.

For additional information on careers for historians, send a self-addressed, stamped envelope to:

American Association for State and Local History, 1400 Eighth Avenue South, Nashville, Tenn. 37203.

For information on museum careers and museum studies programs, contact:

Office of Museum Programs, Arts and Industries Building, Room 2235, Smithsonian Institution, Washington, D.C. 20560.

For information on training for museum careers, contact:

American Association of Museums, 1055 Thomas Jefferson St. NW., Washington, D.C. 20007.

Hotel Managers and Assistants

(D.O.T. 163.117-018; 187.117-038, .167-078, -110, -122, -126)

Nature of the Work

Hotel managers are responsible for operating their establishments profitably and satisfying guests. They determine room rates and credit policy, direct the operation of the foodservice operation, and manage the housekeeping, accounting, security, and maintenance departments of the hotel. Handling problems and coping with the unexpected are important parts of the job.

A small hotel or motel requires only a limited staff, and the manager may have to fulfill various front office duties, such as taking reservations and assigning rooms. When management is combined with ownership,

these activities may expand to include all aspects of the business.

General managers of large hotels usually have several assistants or department heads who manage various parts of the operation. Because the hotel restaurant and cocktail lounge are important to the success of the entire establishment, they almost always are operated by managers with experience in the restaurant field. Other areas that usually are handled separately are advertising, rental of banquet and meeting facilities, marketing and sales, personnel, and accounting.

Large hotel and motel chains often centralize some activities, such as purchasing and advertising, so that individual hotels in the chain may not need managers for these departments. Managers who work for chains may be assigned to organize a newly built or purchased hotel or to reorganize an existing hotel or motel that is not operating successfully.

About 168,000 hotel and motel managers worked in 1978. More than a third were self-employed.

Training, Other Qualifications, and Advancement

Experience generally is the most important consideration in selecting managers. However, employers increasingly are emphasizing college education. A bachelor's degree in hotel and restaurant administration provides particularly strong preparation for a career in hotel management. In 1979, about 50 colleges and universities offered 4-year programs in this field. Applicants to these programs may face increasing competition in the coming years, however. Many junior colleges, technical institutes, and the Educational Institute of the American Hotel & Motel Association also have courses in hotel work that provide a good background.

Included in many college programs in hotel management are courses in hotel administration, accounting, economics, data processing, housekeeping, food service management and catering, and hotel maintenance engineering. Part-time or summer work in hotels and restaurants is encouraged because the experience gained and the contacts with employers may benefit students when seeking a job after graduation.

Managers should have initiative, self-discipline, and the ability to organize and direct the work of others. They must be able to solve problems and concentrate on details.

Sometimes large hotels sponsor specialized, on-the-job management training programs which enable trainees to rotate among various departments and receive a thorough knowledge of the hotel's operation. Other hotels may help finance outstanding employees in acquiring the necessary training in hotel management.

In small hotels, managers may have to fulfill various front office duties.

Most hotels promote employees who have proven their ability, usually front office clerks, to assistant manager and eventually to general manager. Newly built hotels, particularly those without well-established on-the-job training programs, often prefer experienced personnel for managerial positions. Hotel and motel chains may offer better opportunites for advancement than independent properties, because employees can transfer to another hotel or motel in the chain or to the central office if an opening occurs.

Employment Outlook

Employment of hotel managers is expected to grow more slowly than the average for all occupations through the 1980's. Some job openings will occur as additional hotels and motels are built and chain and franchise operations spread. However, most openings will occur as experienced managers die, retire, or leave the occupation. Applicants who have college degrees in hotel administration will have an advantage in seeking entry positions and later advancement.

Related Occupations

Hotel managers and assistants are not the only workers concerned with organizing and directing a business where pleasing people is very important. Other workers with similar responsibilities include apartment managers, food service managers, department managers, office managers, and sales managers.

Sources of Additional Information

See the chapter on the hotel industry elsewhere in the *Handbook* for information on earnings and working conditions, sources of additional information, and more information on employment outlook.

Industrial Designers

(D.O.T. 142.061-026)

Nature of the Work

When people buy a product, whether it's a home appliance, a new car, or a ballpoint pen, they want it to be as attractive, safe, and easy to use as possible. Industrial designers combine artistic talent with knowledge of marketing, materials, and methods of production to improve the appearance and functional design of products so that they compete favorably with similar goods on the market.

As the first step in their work, industrial designers gather information on how the product compares with competing products, the needs of the user of the product, fashion trends, and effects of the product on its environment. After the initial research, industrial designers sketch different designs and consult with managers, engineers, production specialists, and sales and market research

personnel about the feasibility of each idea. This development team considers such factors as visual appeal, convenience, utility, safety, maintenance, and cost to the manufacturer, distributor, and consumer.

After company officials select the most suitable design, the industrial designer or a professional modeler makes a model, often of clay so that it can be easily modified. After any necessary revisions, a final or working model is made, usually of the material to be used in the finished product. The approved model then is put into production.

Although most industrial designers are product designers, many others are involved in different facets of design. To create favorable public images for companies and for government services, some designers develop trademarks or symbols that appear on the firm's product, advertising, brochures, and stationery. Some design containers and packages that both protect and promote their contents. Others prepare small display exhibits or the entire layout for industrial fairs. Some design the interior layout of special purpose commercial buildings such as restaurants and supermarkets.

Corporate designers usually work only on products made by their employer. This may involve filling day-to-day design needs of the company or long-range planning of new products. Independent consultants who serve more than one industrial firm often plan and design a great variety of products.

Working Conditions

Industrial designers generally work in clean, well-lighted, and well-ventilated rooms. They normally work 5 days, 35-40 hours a week, but occasionally, they work overtime to meet deadlines.

Designers may be frustrated at times when their designs are rejected. Independent consultants, who are paid by the assignment, are sometimes under pressure to find new clients if their workload diminishes.

Places of Employment

About 13,000 persons were employed as industrial designers in 1978. Most worked for large manufacturing companies designing either consumer or industrial products or for design consulting firms. Others did freelance work, or were on the staffs of architectural and interior design firms. A few taught industrial design in colleges, universities, and art schools.

Industrial design consultants work mainly in large cities such as New York, Chicago, Los Angeles, and San Francisco. Designers with industrial firms usually work in or near the manufacturing plants of their companies, often in small and medium-sized cities.

Training, Other Qualifications, and Advancement

Completing a course of study in industrial design in an art school, in a university, or in a techncial college is the usual requirement for entering this field of work. Persons majoring in engineering, architecture, and fine arts may qualify as industrial designers if they have appropriate experience and artistic talent. Most large manufacturing firms hire only industrial deisgners who have a bachelor's degree in the field.

In 1978, 33 colleges and art schools offered programs in industrial design that were either accredited by the National Association of Schools of Art or recognized by the Industrial Designers Society of America. Most of these schools award a bachelor's degree in industrial design or art. A few also offer a master's degree in industrial design. Industrial design programs vary among schools, but most bachelor degree programs take 4 or 5 years. Many schools do not allow formal entry into the program until a student has successfully finished a year of basic art and design courses. Applicants may be required to submit sketches and other examples of their artistic ability.

Most college and university programs maintain a balance between science, humanities, and art; art schools generally stress a strong foundation in art. In most programs, students spend much time in the lab designing objects in three dimensions. In studio courses, students make models with clay, wood, plaster, and other easily worked materials. In schools that have the necessary machinery, students make models of their designs while learning to use metalworking and woodworking machinery. Students also take courses in drawing, drafting, and other visual communications skills.

Many industrial design programs, particularly in a liberal arts college or university, also include courses in basic engineering, in the physical and natural sciences, in the behavioral sciences, and in marketing and business administration.

Industrial designers must have creative talent, drawing skills, and the ability to translate abstract ideas into tangible designs. They must understand and meet the needs and tastes of the public, rather than design only to suit their own artistic sensitivity. Designers should not be discouraged when their ideas are rejected—often designs must be resubmitted many times before one is accepted. Since industrial designers must cooperate with engineers and other staff members, the ability to work and communicate with others is essential. A sound understanding of marketing, sales work, and other business practices also is important.

Applicants for jobs should assemble a "portfolio" of drawings and sketches to demonstrate their creativity and ability to communicate ideas.

Beginning industrial designers frequently do simple assignments. As they gain experience, they work on their own, and may become supervisors with major responsibility for the design of a product or a group of products. Those who have an established reputation and the necessary funds may start their own consulting firms.

Industrial designers often consult with engineers when designing new products.

Employment Outlook

Employment in this relatively small occupation is expected to grow about as fast as the average for all occupations through the 1980's. Although the trend in recent years has been away from frequent redesign of household products, automobiles, and industrial equipment, continued emphasis on issues such as ecology and product safety should increase demand for industrial designers.

Demand for industrial designers may fluc-

tuate over short-run periods. During economic downturns when the market for new products is dampened, the need for these workers also tends to decline.

Employment opportunities are expected to be best for college graduates with degrees in industrial design. In addition to openings resulting from increased demand for industrial designers, some employment opportunities will arise each year as designers die, retire, or transfer to other fields.

Earnings

Salaries for inexperienced industrial designers with a bachelor's degree generally ranged from $10,000 to $14,000 a year in 1978, according to limited data. After several years' experience, it is possible to earn $15,000 to $20,000 a year. Salaries of those with many years of experience averaged more than $30,000 a year in 1978, but varied according to individual talent and the size and type of firm.

Earnings of industrial designers who own their consulting firms fluctuate greatly, but in general tend to be higher than the average earnings of corporate industrial designers.

Related Occupations

Workers in other occupations who design or arrange objects and materials to optimize their appearance, function, and value include architects, clothes designers, commercial artists, display designers, floral designers, interior designers, and set designers.

Sources of Additional Information

A brochure about careers and a list of schools offering courses and degrees in industrial design are available for 50 cents from:

Industrial Designers Society of America, 1717 N St. NW., Washington, D.C. 20036.

Insurance Agents and Brokers

(D.O.T. 250.257-010)

Nature of the Work

Insurance agents and brokers sell policies that protect individuals and businesses against future losses and financial pressures. They may help plan financial protection to meet the special needs of a customer's family; advise about insurance protection for an automobile, home, business, or other property; or help a policyholder obtain settlement of an insurance claim.

Agents and brokers usually sell one or more of the three basic types of insurance: Life, property-liability (casualty), and health. Life insurance agents, sometimes called life underwriters, offer policies that pay survivors when a policyholder dies. Depending on the policyholder's circumstances, a life policy can be designed to provide retirement income, funds for the education of children, or other benefits. Casualty insurance agents sell policies that protect individual policyholders from financial losses as a result of automobile accidents, fire or theft, or other losses. They also sell industrial or commercial lines, such as workers' compensation, product liability, or medical malpractice insurance. Health insurance policies offer protection against the costs of hospital and medical care or loss of income due to illness or injury, and many life and casualty agents offer health insurance in addition to other lines. Many agents also offer securities, such as mutual fund shares or variable annuities.

An insurance agent may be either an insurance company employee or a broker—an independent business person authorized to represent one insurance company or more. Brokers are not under exclusive contract with any single company; instead, they place policies directly with the company that best meets a client's needs. Otherwise, agents and brokers do much the same kind of work.

They spend most of their time discussing insurance needs with prospective and existing customers. Some time must be spent in office work to prepare reports, maintain records, plan insurance programs that are tailored to prospects' needs, and draw up lists of prospective customers. Specialists in group policies may help an employer's accountants set up a system of payroll deductions for employees covered by the policy.

Working Conditions

Agents must do a considerable amount of traveling to meet with clients. They generally arrange their own hours of work, and often schedule evening and weekends appointments for the convenience of clients. Some agents work more than 40 hours a week.

Places of Employment

About 540,000 agents and brokers sold insurance in 1978, thousands of whom worked part time. About half of the agents and brokers specialized in life insurance; the rest, in some type of property/liability insurance. A growing number of agents (called multiline agents) offer both life and property-liability policies to their customers.

Agents and brokers are employed in cities and towns throughout the country, but most work near large population centers.

Training, Other Qualifications, and Advancement

Although many employers prefer college graduates for jobs selling insurance, most will hire high school graduates with potential or proven sales ability. Many colleges and universities offer courses in insurance subjects and some schools offer a bachelor's degree in insurance. College courses in subjects such as economics, business law, government, and business administration enable the insurance agent to relate insurance to other personal finance problems and to constantly changing economic conditions. Courses in psychology and sociology can prove useful in improving sales techniques. College training may help the agent grasp the fundamentals and procedures of insurance selling more quickly.

All agents and most brokers must obtain a license in the State where they plan to sell insurance. In most States, licenses are issued only to applicants who pass written examinations covering insurance fundamentals and the State insurance laws. Agents who plan to sell mutual fund shares and other securities also must be licensed by the State. New

Agents spend much of their time contacting customers by telephone.

agents usually receive training at the agencies where they will work and frequently also at the insurance company's home office. Beginners sometimes attend company-sponsored classes to prepare for examinations. Others study on their own and accompany experienced sales workers when they call on prospective clients.

Agents and brokers can broaden their knowledge of the insurance business by taking courses at colleges and universities and attending institutes, conferences, and seminars sponsored by insurance organizations. The Life Underwriter Training Council (LUTC) awards a diploma in life insurance marketing to agents who successfully complete the Council's 2-year life program. There is also a course in health insurance. As agents or brokers gain experience and knowledge, they can qualify for the Chartered Life Underwriter (CLU) designation by passing a series of examinations given by the American College of Bryn Mawr, Pa. In much the same way, a property-liability agent can qualify for the Chartered Property Casualty Underwriter (CPCU) designation by passing a series of examinations given by the American Institute for Property and Liability Underwriters. The CLU and CPCU designations are recognized marks of achievement in their respective fields.

Agents and brokers should be enthusiastic, self-confident, and able to communicate effectively. Many employers will give personality tests to prospective employees because personality attributes are important in sales work. Since agents usually work without supervision, they need initiative to locate new prospects. For this reason, many employers seek people who have been successful in other jobs.

Insurance agents who show unusual sales ability and leadership may become a sales manager in a local office or assume a managerial job in a home office. A few agents may advance to top positions as agency superintendents or company vice-presidents. Many who have built up a good clientele prefer to remain in sales work. Some, particularly in the property-liability field, eventually establish their own independent agencies or brokerage firms.

Employment Outlook

Employment of insurance agents and brokers is expected to grow about as fast as the average for all occupations through the 1980's as the volume of insurance sales continues to expand. Many additional jobs will open as agents and brokers die, retire, or leave their jobs to seek other work. Due to the highly competitive nature of insurance selling, many beginners leave the field because they are unable to establish a sufficiently large clientele. Therefore, opportunities should be quite favorable for ambitious people who enjoy sales work.

Future demand for agents and brokers depends on the volume of insurance sales. Volume should increase rapidly over the next decade as a larger proportion of the population enters the period of peak earnings and family responsibilities. Life insurance sales should grow as more families select policies designed to provide educational funds for their children and retirement income. Rising incomes also may stimulate the sales of equity products such as mutual funds, variable annuities, and other investments. Sales of property-liability insurance should rise as more consumer purchases are insured and as complex types of commercial coverage, such as product liability and workers' compensation, are expanded.

However, employment of agents and brokers will not keep pace with the rising level of insurance sales because more policies will be sold to groups and by mail. In addition, each agent should be able to handle more business as computers take over some of the time-consuming clerical tasks. The trend toward multiline agents also will cause employment to rise more slowly than the volume of insurance sales.

Earnings

Beginners in this occupation often are guaranteed a moderate salary while they are learning the business and building a clientele. In many large companies, new agents receive about $900 a month during this training period, which can last up to 6 months or longer. Thereafter, most agents are paid on a commission basis. The size of the commission depends on the type and amount of insurance sold, and whether the transaction is a new policy or a renewal. After several years, an agent's commissions on new policies and renewals may range from $12,000 to $25,000 annually. There is virtually no limit on what an agent can earn, however. Thousands of established agents and brokers earn more than $40,000 a year, and many highly successful ones earn more than $100,000 a year.

Agents and brokers generally pay their own automobile and traveling expenses. In addition, those who own and operate independent businesses must pay office rent, clerical salaries, and other operating expenses out of their earnings.

Although insurance agents usually are free to arrange their own hours of work, they often schedule appointments during evenings and weekends for the convenience of clients. Some agents work more than the customary 40 hours a week. Most agents and brokers enjoy excellent fringe benefits such as paid vacations, group insurance plans, and retirement pensions. The size of most pensions is dependent on how much insurance an agent sells. (See the statement on the insurance industry for more information about working conditions in life and property-liability companies.)

Related Occupations

Other workers who have technical sales responsiblities include real estate agents and brokers, securities workers, and manufacturing company representatives.

Sources of Additional Information

General occupational information about insurance agents and brokers is available from the home office of many life and property-liability insurance companies. Information on State licensing requirements may be obtained from the department of insurance at any State capital.

Information about a career as a life insurance agent also is available from:

American Council of Life Insurance, 1850 K St. NW., Washington, D.C., 20006.

The National Association of Life Underwriters, 1922 F St. NW., Washington, D.C. 20006.

For career information on property/liability agents, contact:

Insurance Information Institute, 110 William St., New York, N.Y. 10038.

National Association of Insurance Agents, Inc., 85 John St., New York, N.Y. 10038.

American Alliance of Insurance, 20 N. Wacker Dr., Chicago, Ill. 60606.

The National Association of Independent Insurers, Public Relations Department, 2600 River Rd., Des Plaines, Ill. 60018.

Interior Designers

(D.O.T. 142.051)

Nature of the Work

The creative work of interior designers helps make our living, working, and playing areas more attractive and useful. Interior designers plan and supervise the design and arrangement of building interiors and furnishings. They may work on either private homes or commercial buildings.

When planning any space, designers first consider the purpose of the area, the needs of the occupants, and the client's budget and taste. For instance, a very expensive couch that is easily soiled would not suit a family's needs for their recreation room, nor would it be appropriate for the reception area of a doctor's office.

The next step of the designer's job involves preparing sketches and detailed plans. These will show all the furniture and accessories the designer is considering as well as any changes in the structure itself. Changes may vary from planning a new wall to separate the dining and living rooms to creating a work cubicle in an office. Sometimes the clients do not approve the plans, in which case the designer will revise them.

Once the client approves both the plans and the cost, the designer may order the furnishings, supervise the work of painters, floor finishers, carpet layers, and other craft workers, if they are needed, and make sure the furnishings are installed and arranged according to the approved plan.

Designers who work in large department and furniture stores that have separate design departments advise customers on decorating and design plans. Although their principal function is to help sell the store's merchandise, they may suggest furnishings from other sources when essential to the customer's plans. Department store designers also frequently advise the store's buyers and executives about style and color trends in interior furnishings.

Interior designers who specialize in nonresidential structures often work for clients on large design projects such as the interiors of entire office buildings, hospitals, and libraries. Generally, they plan the complete layout of rooms without changes to the structure of the building. They also may redesign or renovate the interiors of old buildings. In these cases, an architect checks the plans to make sure that they comply with building requirements. Some interior designers also design the furniture and accessories to be used in various structures, and then arrange for their manufacture. A few design the interiors of ships and aircraft or stage sets used for motion pictures or television.

Regardless of where they are working, designers must deal with paperwork; they must place orders, figure estimates, and maintain records of where to purchase hundreds of different types of furnishings. Handling business matters such as these requires close attention to detail and accuracy.

Working Conditions

Designers' work hours are sometimes long and irregular. They usually adjust their workday to suit the needs of their clients, meeting with them during the evening or on weekends when necessary. They may transact business in clients' homes or offices, in their own offices, or in a variety of other locations.

Each assignment offers a challenge to solve the client's problems with creativity and imagination. Designers generally work at their own pace in a quiet atmosphere, but sometimes the work is hectic. Most design jobs require coordinating the activities of building trades workers and suppliers, which is not an easy task when deadlines are tight and delivery problems crop up. The ability to handle details, even under pressure, is very important.

Places of Employment

About 79,000 persons worked as interior designers in 1978, primarily in large cities.

Most designers work for design firms. They work independently with the firm's clients or serve as assistants to senior designers. Others work as members of design teams.

Some interior designers advise customers in large department or furniture stores. Others work for hotel and restaurant chains, builders, government agencies, and other organizations that do a great deal of building or renovation. Some work for architects, furniture suppliers, antique dealers, furniture and textile manufacturers, or other manufacturers in the interior furnishings field. Interior designers also work for magazines that feature articles on home furnishings.

Some experienced interior designers run their own firms, either alone or in partnership with other designers.

Training, Other Qualifications, and Advancement

Formal training in interior design is increasingly important for entry into this field. Most architectural firms, well-established design firms, department and furniture stores, and other major employers accept only professionally trained people for beginning jobs. The types of training available include 3-year programs in a professional school of interior design, 4-year college or university programs that grant a bachelor's degree, or postgraduate programs leading to a graduate degree. The curriculum usually includes principles of design, history of art, freehand and mechanical drawing or architectural drafting, painting, study of the essentials of architecture as they relate to interiors, design of furniture and exhibitions, and study of various materials, such as woods, plastics, metals, and fabrics. A knowledge of furnishings, art pieces, and antiques is important. In addition, courses in sales and business techniques and management are valuable.

Membership in the American Society of Interior Design or in the Institute of Business Designers is a recognized mark of achievement in this profession. Membership usually requires the completion of 3 or 4 years of post high school education in design and several years of practical experience in the field, including supervisory work. In addition, satisfactory completion of a factual and design-problem examination is necessary for professional membership.

Persons starting in interior design usually serve a training period with a design firm, department store, or furniture store. They may act as receptionists, as shoppers with the task of matching materials or finding accessories, or as stockroom assistants, salespersons, assistant decorators, or junior designers. In most instances, from 1 to 5 years of on-the-job training are required before a trainee becomes eligible for advancement to designer. Beginners who do not get trainee jobs often sell fabric, lamps, or other interior furnishings in department or furniture stores to gain experience in dealing with customers and to become familiar with the merchandise. There is no guarantee, however, that this experience will result in a job in design, although it could lead to a career in merchandising.

After considerable experience, designers may advance to design department head or to other supervisory positions in department stores or in large design firms. If they have the necessary funds and aptitude for business, they may open their own firms.

Artistic talent is crucial for interior designers. People in this field also need a strong color sense, an eye for detail, and a sense of balance and proportion. An esthetic sense, or sensitivity to beauty, is absolutely essential. Because styles and tastes in art and fashion change quickly, people in this field need to be versatile and alert to new ideas and trends.

A successful designer must also be well organized and good at handling details. The ability to work well with people is very important, for a designer must be able to deal effectively with clients, suppliers, and workers.

Interior designers coordinating wall and floor coverings.

Employment Outlook

Persons seeking beginning jobs in interior design are expected to face competition through the 1980's. Interior design is a competitive field that requires talent, training, and business ability, and many applicants vie for the better jobs. Talented college graduates who major in interior design and graduates of professional schools of interior design will find the best opportunities for employment. Those with less talent or without formal training will find it increasingly difficult to enter this field.

Employment of interior designers is expected to increase about as fast as the average for all occupations through the 1980's. Growth in population, personal incomes, expenditures for home and office furnishings, and the increasing use of design services in both homes and commercial establishments should contribute to a greater demand for these workers. In addition to new jobs, some openings will be created by the need to replace designers who die, retire, or leave the field.

Department and furniture stores are expected to employ an increasing number of designers as their share in the growing volume of design work for commercial establishments and public buildings increases. Interior design firms also are expected to continue to expand.

Employment of interior designers, however, is sensitive to changes in general economic conditions because people often forego design services when the economy slows down.

Earnings

Beginners usually are paid a straight salary plus a small commission. Starting salaries can range from the minimum wage plus a small commission to a fixed salary of $150 a week or higher. Firms in large metropolitan areas usually pay the highest salaries.

Some experienced interior designers are paid straight salaries, some receive salaries plus commissions based on the value of their sales, while others work entirely on commissions.

Incomes of experienced designers vary greatly. Many persons earn from $12,000 to $50,000 a year, and highly successful designers can earn much more. A small number of nationally recognized professionals earn well over $50,000 annually.

The earnings of self-employed designers vary widely, depending on the volume of business, their professional reputation, the economic level of their clients, and their own business competence.

Related Occupations

Interior designers must have artistic talent, be creative, and have good color sense and good taste. Other occupations that require similar skills include exhibit designers, fabric designers, display workers, and floral designers.

Sources of Additional Information

For information about careers in interior design and a list of schools offering programs in this field, contact:

American Society of Interior Design, 730 Fifth Ave., New York, N.Y. 10019.

Career information is also available from:

Institute of Business Designers, National Headquarters, 1155 Merchandise Mart, Chicago, Ill. 60654.

Landscape Architects

(D.O.T. 001.061-018)

Nature of the Work

Everyone enjoys attractively designed residential areas, public parks, and commercial zones. Landscape architects design outdoor areas that are functional as well as esthetically pleasing. Resource conservation is another important concern, one that requires a knowledge of scientific as well as artistic principles.

Landscape architects are hired by many types of organizations—from real estate firms starting new developments to municipalities constructing airports or parks. They usually plan the arrangement of vegetation, walkways, and other natural features of open spaces. They may also design areas where constructed materials predominate—as on streets that have been modified to improve pedestrian access and limit automobile traffic. They sometimes supervise the construction stages of outdoor projects.

Landscape architects first consider the nature and purpose of the project, the funds available, and the proposed elements in planning a site. Next, they study the site and map features such as the slope of the land and the position of existing buildings, roads, walkways, and trees. They also observe the sunny parts of the site at different times of the day, soil texture, existing utilities, and many other landscape features. Then, working sometimes as the leader of a design team or sometimes in consultation with the project architect or engineer, they draw up plans to develop the site. If the plans are approved, landscape architects prepare working drawings showing all existing and proposed features. Landscape architects outline in detail the methods of constructing features and draw up lists of building materials. They then may invite landscape contractors to bid for the work.

Some landscape architects specialize in certain types of projects such as parks and playgrounds, hotels and resorts, shopping centers, or public housing. Still others specialize in services such as regional planning and resource management, feasibility and cost studies, or site construction.

Working Conditions

Landscape architects spend a substantial amount of time in their offices preparing working drawings, cost estimates, and models, and also making presentations to clients. But this time indoors is balanced by the time they spend outdoors, studying and planning sites, and supervising actual landscape projects.

Places of Employment

About 14,000 persons worked as landscape architects in 1978. Most had their own businesses or worked for architectural, landscape architectural, or engineering firms. Others were employed by government agencies concerned with forest management, water storage, public housing, city planning, urban renewal, highways, parks, and recreation. The Federal Government employed over 600 landscape architects, mainly in the Departments of Agriculture, Defense, and Interior. Some landscape architects were employed by landscape contractors, and a few taught in colleges and universities.

Employment of landscape architects is concentrated around large metropolitan areas, primarily on the East and West Coasts. However, employment opportunities have recently been growing in the Southwest.

Training, Other Qualifications, and Advancement

A bachelor's degree in landscape architecture, which takes 4 or 5 years, is usually the minimum educational requirement for entering the profession. The American Society of Landscape Architects accredits about 40 colleges and universities that offer such programs. About 60 other schools also offer programs or courses in landscape architecture.

A person interested in landscape architecture should take high school courses in mechanical or geometrical drawing, art, botany, and more mathematics than the minimum required for college entrance. Written and spoken English is important, too, since landscape architects must be able to communicate their ideas to their clients and make presentations before large groups.

College courses in this field include technical subjects such as surveying, landscape construction, sketching, design communications, and city planning. Other courses include horticulture and botany as well as English, science, mathematics, and the social sciences. Most college programs also include field trips to view and study examples of landscape architecture.

Thirty-eight States require a license, based on the results of a uniform national licensing examination, for independent practice of landscape architecture. Admission to the licensing examination usually requires a degree from an accredited school of landscape architecture plus 2 to 4 years of experience. Lengthy apprenticeship training (6-8 years)

Landscape architects need a creative imagination and an appreciation for nature.

under an experienced landscape architect sometimes may be substituted for college training.

Persons planning careers in landscape architecture should have an appreciation for nature. Creativity and artistic talent are necessary, too, for landscape architects are primarily concerned with design. They employ lines, colors, textures, spaces, and light to create an esthetically pleasing land use plan. These elements of design are carried out in a project with trees, plants, stones, terrain, flower gardens, and other natural features as well as with constructed materials common to architecture and engineering that go into such outdoor features as plazas, fountains, kiosks, and rest areas.

Self-employed landscape architects must understand business practices. Working for landscape architects or landscape contractors during summer vacations helps a person understand the practical problems of the profession and may be helpful in obtaining employment after graduation.

New graduates usually begin as junior drafters, tracing drawings and doing other simple drafting work. After gaining experience, they help prepare specifications and construction details and handle other aspects of project design. After 2 or 3 years, they can usually carry a design through all stages of development. Highly qualified landscape architects may become associates in private firms; landscape architects who progress this far, however, often open their own offices.

Employment Outlook

Employment of landscape architects is expected to grow faster than the average for all occupations through the 1980's. Additionally, new entrants will be needed as replacements for landscape architects who retire or die.

The level of new construction plays a major role in determining demand for landscape architects, and anticipated growth in new construction is expected to spur demand over the long run. However, the cyclical nature of construction activity may cause employment to fluctuate from year to year.

Another factor underlying the increased demand for landscape architects is the growing interest in city and regional environmental planning. Metropolitan areas will require landscape architects to plan efficient and safe land use for growing populations. Legislation to promote environmental protection may spur demand for landscape architects to participate in planning and designing transportation systems, outdoor recreation areas, and land reclamation projects, as well as to ensure safe industrial growth. Recently enacted legislation in the areas of historic preservation and coastal zone management is also expected to affect employment in this field.

Earnings

Newly graduated landscape architects generally earned from $10,000 to $15,000 a year in 1978. Most experienced landscape architects earned between $15,000 and $25,000 a year, although some highly skilled persons earned salaries of over $30,000 a year. Earnings of self-employed landscape architects ranged from $10,000 a year to well over $25,000 a year, depending on the individual's educational background, experience, and geographic location.

The Federal Government, in 1979, paid new graduates with a bachelor's degree annual salaries of $10,500 or $13,000, depending their qualifications. Those with an advanced degree had a starting salary of about $15,900 a year. Landscape architects in the Federal Government averaged $24,456 a year in 1978.

Salaried employees both in government and in landscape archetectural firms usually work regular hours, although employees of private firms may also work overtime during seasonal rush periods to meet a deadline. Self-employed persons often work long hours.

Related Occupations

A sensitivity to beauty is essential in combining the elements of design and nature to develop a composite landscape project. Others whose work requires design skills include architects, ornamental horticulturists, environmental planners, urban planners, and land-use planners.

Sources of Additional Information

Additional information, including a list of colleges and universities offering accredited courses of study in landscape architecture, is available from:

American Society of Landscape Architecture, Inc., 1900 M St. NW., Washington, D.C. 20036.

For information on a career as a landscape architect in the Forest Service, write to:

U.S. Department of Agriculture, Forest Service, Washington, D.C. 20250.

Lawyers

(D.O.T. 110 and 090.227-010)

Laws permeate every aspect of our society. They regulate the entire spectrum of relationships among individuals, groups, businesses, and governments. They define rights as well as restrictions, covering such diverse human activities as judging and punishing criminals, granting patents, drawing up business contracts, paying taxes, settling labor disputes, constructing buildings, and administering wills.

Because social needs and attitudes are continually changing, the legal system that regulates our social, political, and economic relationships also change. Keeping the law responsive to human needs is the work of lawyers. Also called attorneys, lawyers link the legal system and society. To perform this role, they must understand the world around them and be sensitive to the numerous aspects of society that the law touches. They must comprehend not only the words of a particular statute, but the human circumstances it addresses as well.

As our laws grow more complex, the work of lawyers takes on broader significance. Laws affect our lives in new ways as the legal system takes on regulatory tasks in areas such as transportation, energy conservation, consumer protection, and social welfare. Lawyers interpret these laws, rulings, and regulations for individuals and businesses.

Nature of the Work

Certain activities are common to nearly every attorney's work. Probably the most fundamental is interpretation of the law. Every attorney, whether representing the defendant in a murder trial or the plaintiff (suing party) in a lawsuit, combines an understanding of the relevant laws with knowledge of the facts in the case to determine how the first affects the second. Based on this determination, the attorney decides what action would best serve the interests of the client.

To interpret the law, lawyers do research. They must stay abreast of their field, in both legal and nonlegal matters. An attorney representing electronics manufacturers, for example, must follow trade journals and the latest Federal regulations affecting his or her clients. Attorneys in the State Department must remain well versed in current events and international law, while divorce lawyers read about the changing role of the family in modern society.

A lawyer consults with clients to determine the details of problems, advise them of the law, and suggest action that might be taken. To be effective, a lawyer must deal with people in a courteous, efficient manner and not disclose personal matters. Lawyers serve as models for conduct and their practice is governed by strict rules of ethics.

Finally, most lawyers write reports or briefs which must be communicated clearly and precisely. The more detailed aspects of a lawyer's job depend upon his or her field and position.

A significant number specialize in one branch of law, such as corporate, criminal, labor, patent, real estate, tax, admiralty, probate, or international law. Communications lawyers, for example, may represent radio and television stations in their dealings with the Federal Communications Commission (FCC). They help established stations prepare and file license renewal applications, employment reports, and other documents required by the FCC on a regular basis. They also keep their clients informed of changes in FCC regulations. Communications lawyers help individuals or corporations buy or sell a station or establish a new one.

Other lawyers representing public utilities before the Federal Power Commission (FPC) and other regulatory agencies handle matters involving utility rates. They develop strategy, arguments, and testimony; prepare cases for presentation; and argue the case. These lawyers also inform clients about changes in regulations and give advice about the legality of their actions.

Still other lawyers advise insurance companies about the legality of insurance transactions. They write insurance policies to conform with the law and to protect companies from unwarranted claims. They review claims filed against insurance companies and represent companies in court.

Private practitioners specializing in other areas deal with wills, trusts, contracts, mortgages, titles, and leases. Some manage a person's property as trustee or see that provisions of a client's will are carried out as executor. A small number of lawyers work entirely in the courtroom. An increasing number handle only public interest cases—civil or criminal—which have a potential impact extending well beyond the individual client. Attorneys hope to use these cases as a vehicle for legal and social reform.

A single client may employ a lawyer full time. Known as house counsel, this lawyer usually advises a company about legal questions that arise from business activities. Such questions might involve patents, government regulations, a business contract with another company, or a collective bargaining agreement with a union.

Attorneys employed at the various levels of government constitute still another category. Criminal lawyers may work for the State attorney general, a prosecutor or public defender, or the court itself. At the Federal level, attorneys may investigate cases for the Justice Department or other agencies. Lawyers at every government level help develop laws and programs; draft legislation; establish enforcement procedures; and argue cases.

Other lawyers work for legal aid societies —private, nonprofit corporations established to serve poor people in particular areas. These lawyers generally handle civil rather than criminal cases.

A relatively small number of attorneys work in law schools. Most specialize in one or more subjects, while others serve as administrators. Some work full time in nonacademic settings and teach part time. (For additional information, see the *Handbook* statement on college and university faculty.)

Some attorneys use their legal background in administrative or managerial positions in various departments of large corporations. A transfer from a corporation's legal department to another department often is viewed as a way to gain administrative experience and rise in the ranks of management.

People may use their legal background as journalists, management consultants, financial analysts, insurance claim adjusters, real estate appraisers, lobbyists, tax collectors, probation officers, and credit investigators. A legal background also is an asset to office seekers.

Working Conditions

Lawyers do most of their work in offices and courtrooms. They sometimes meet in clients' homes or places of business and, when necessary, in hospitals or prison cells. They frequently travel to attend meetings, to gather evidence, and to appear before courts, legislative bodies, and other authorities.

Salaried lawyers in government and private firms generally have structured work schedules. Law teachers, on the other hand, whose schedules are more flexible, divide their time among teaching, research, and administrative responsibilities. Independent lawyers may work irregular hours while conducting research, conferring with clients, or preparing briefs during nonoffice hours. Lawyers generally work long hours and are under particularly heavy pressure when a case is being tried. Preparation for court includes keeping abreast of the latest laws and judicial decisions.

Although work generally is not seasonal, the work of tax lawyers may be an exception. Since lawyers in private practice can determine their own workload, many stay in practice well beyond the usual retirement age.

Painstaking research is an integral part of a trial attorney's job.

Places of Employment

Over 480,000 persons worked as lawyers in 1978. About 70 percent of them practiced privately. Many worked in law firms; others had solo practices. Most of the remaining 30 percent held positions in Federal, State, and local government. Others were employed as house counsel by public utilities, transportation firms, banks, insurance companies, real estate agencies, manufacturing firms, welfare and religious organizations, and other business firms and nonprofit organizations. About 8,000 lawyers taught full or part time in law schools. Some salaried lawyers also have independent practices; others do legal work part time while in another occupation.

Training, Other Qualifications, and Advancement

To practice law in the courts of any State, a person must be admitted to its bar. Applicants for admission to the bar must pass a written examination; however, a few States drop this requirement for graduates of their own law schools. Lawyers who have been admitted to the bar in one State occasionally may be admitted in another without taking an examination if they meet that State's standards of good moral character and have a specified period of legal experience. Federal courts and agencies set their own qualifications for those practicing before them.

To qualify for the bar examination in most States, an applicant must complete at least 3 years of college and graduate from a law school approved by the American Bar Association (ABA) or the proper State authorities. (ABA approval signifies that the law school meets certain standards developed by the Association to promote quality legal education. With certain exceptions, graduates of nonapproved schools generally are restricted to taking the bar examination and practicing in the State in which the school is located.) A few States accept the study of law in a law office or in combination with study in a law school; only California accepts the study of law by correspondence as qualification for taking the bar exam. Several States require registration and approval of students by the State Board of Examiners, either before they enter law school or during the early years of legal study.

Although there is no nationwide bar exam, 43 States and the District of Columbia participate in the Multistate Bar Examination (MBE). The MBE, covering issues of broad interest since the early 1970's, is given in addition to the State bar exam. States vary in their treatment of MBE scores.

The required college and law school education usually takes 7 years of full-time study after high school—4 years of undergraduate study followed by 3 years in law school. Although some law schools accept a very small number of students after 3 years of college, an increasing number require applicants to have a bachelor's degree. To meet the needs of students who can attend only part time, a number of law schools have night or part-time divisions which usually require 4 years of study. In 1977 about one-seventh of all graduates of ABA-approved schools were part-time students.

Competition for admission to law school has become intense in recent years. Enrollments have risen very rapidly, with applicants outnumbering available seats by about 2 to 1. Competition is even stiffer in more prestigious law schools. Although the increase in enrollments may slow during the 1980's, admission to law school will remain the first of several hurdles for prospective lawyers.

Preparation for a career as a lawyer really begins in college. Although there is no such thing as a "prelaw major," the undergraduate program almost always makes a difference. Certain courses and activities are desirable because they give the student the skills needed to succeed both in law school and in the profession. Essential skills—the ability to write, to read and analyze, to think logically, and to communicate verbally—are learned during high school and college. An undergraduate program that cultivates these skills while broadening the student's view of the world is best. Majors in the social sciences, natural sciences, and humanities all are suitable, as long as the student does not specialize too narrowly. Regardless of one's major, English, foreign language (particularly Latin), public speaking, government, philosophy, history, economics, and mathematics, among others, are highly recommended.

Students interested in a particular aspect of law may find related courses helpful; for example, engineering and science courses for the prospective patent attorney, and accounting for the future tax lawyer. In addition, typing is advisable simply for convenience in law school.

Acceptance by most law schools depends on the applicant's ability to demonstrate an aptitude for the study of law, usually through good grades and the Law School Admission Test (LSAT), administered by the Educational Testing Service. In 1978, the American Bar Association approved 167 law schools. Others were approved by State authorities only.

During the first year or year and a half of law school, students generally study fundamental courses such as constitutional law, contracts, property law, and judicial procedures. In the remaining time, they may elect specialized courses in fields such as tax, labor, or corporation law. Practical experience often is acquired by participation in school-sponsored legal aid or legal clinic activities, in the school's moot court where students conduct practice trials under the supervision of experienced lawyers and judges, and through writing on legal issues for the school's law journal.

A number of law schools have clinical programs where students gain legal experience in "lawyering" through practice trials and law school projects under the supervision of practicing lawyers and law school faculty. Law school clinical programs might include work in legal aid clinics, for example, or on the staff of legislative committees. Part-time or summer clerkships also provide experience that can be extremely valuable later on. Such training can provide references or lead directly to a job after graduation, and can help students decide what kind of practice best suits them. Clerkships also may be an important source of financial aid.

Graduates receive the degree of *juris doctor* (J.D.) or *bachelor of law* (LL.B.) as the first professional degree. Advanced study is desirable for those planning to specialize, do research, or teach. Some law students pursue joint degree programs, which generally require an additional year or more. Joint degree programs are offered in a number of areas, including law and business administration; law and public administration; and law and social work.

The practice of law involves a great deal of responsibility. Persons planning careers in law should like to work with people and be able to win the respect and confidence of their clients, associates, and the public. Integrity and honesty are vital personal qualities. Intellectual capacity and reasoning ability are essential to analyze complex cases and reach sound conclusions.

Most beginning lawyers start in salaried positions. Newly hired salaried attorneys usually act as research assistants (law clerks) to experienced lawyers or judges. After several years of progressively responsible salaried employment, many lawyers go into practice for themselves. Some lawyers, after years of practice, become judges.

Employment Outlook

Employment of lawyers grew very rapidly during the late 1970's. Faster-than-average growth is expected to continue through the 1980's as increased population, business activity, and government regulation help sustain the strong demand for attorneys. Employment growth also will be spurred by Supreme Court decisions extending the right to counsel for all persons accused of crimes, an increase in publicly funded legal services for low-income persons, the growth of legal action in such areas as consumer protection, the environment, and safety, and an anticipated increase in the use of legal services by middle-income groups through prepaid legal service programs. As colleges and universities add law courses to their liberal arts, business, and other curriculums, additional lawyers may be needed to teach part time. Most jobs, however, will be created by the need to replace lawyers who die, retire, or leave the occupation for other reasons.

Despite very strong employment growth in this occupation, the sizable number of law school graduates entering the job market each year has created keen competition for jobs. While the number of graduates is expected to level off during the 1980's, competition for jobs will remain intense.

Employers will continue to be selective in hiring new lawyers. Graduates of prestigious law schools and those who rank high in their classes should find salaried positions with law firms, on the legal staffs of corporations and government agencies, and as law clerks for judges. Graduates of less prominent schools and those with lower scholastic ratings will experience some difficulty in finding salaried jobs. An increasing proportion will enter fields where legal training is an asset but not normally a requirement. For example, banks, insurance firms, real estate companies, government agencies, and other organizations seek law graduates to fill many administrative, managerial, and business positions.

With increasing competition for jobs, a law graduate's geographic mobility and experience assume greater importance. The willingness and ability to relocate may be an advantage in getting a job. In addition, employers increasingly seek graduates who have training and experience in a particular field such as tax, patent, or admiralty law.

Establishing a new practice probably will continue to be best in small towns and expanding suburban areas, as long as an active market for legal services already exists. In such communities, competition is likely to be less than in big cities and new lawyers may find it easier to become known to potential clients; also, rent and other business costs are somewhat lower. Nevertheless, starting a new practice will remain an expensive and risky proposition that should be weighed carefully. Salaried positions will continue largely in urban areas where government agencies, law firms, and big corporations are concentrated.

Earnings

Starting salaries offered to 1978 law school graduates varied from a low of $8,000 a year offered by small firms to a high of $29,000 offered by a large corporation. Beginning attorneys in private industry averaged around $18,000. In the Federal Government, annual starting salaries for attorneys in early 1979 were $15,920 or $19,263, depending upon academic and personal qualifications. Factors affecting the salaries offered to new graduates include: Academic record; type, size, and location of employers; and the desired specialized educational background. The field of law makes a difference, too. Patent lawyers, for example, generally are among the highest paid attorneys.

Salaries of experienced attorneys also vary widely according to the type, size, and location of the employers. The average salary of the most experienced lawyers in private industry in 1978 was over $50,000. The median annual salary of nonsupervisory lawyers employed by business corporations in 1977 exceeded $31,000, while some heads of law departments earned over $70,000. General attorneys in the Federal Government averaged around $30,400 a year in 1978; the relatively small number of patent attorneys averaged around $37,400. Although lawyers are concentrated in the Departments of Justice, Defense, and Treasury, significant numbers work in many other Federal agencies.

Lawyers starting their own practice may need to work part time in other occupations during the first years. Lawyers on salary receive increases as they assume greater responsibility. Incomes of lawyers in private practice usually grow as their practices develop. Private practitioners who are partners in law firms generally earn more than those who practice alone.

Related Occupations

Legal training is invaluable in many other occupations. Some of these are abstractors, arbitrators, conciliators, hearing officers, patent agents, title examiners, legislative assistants, and FBI special agents.

Sources of Additional Information

Persons considering law as a career will find information on law schools and prelaw study in the *Prelaw Handbook*, published annually (Law School Admission Services, Box 944, Princeton, N.J. 08540). Copies may be available in public or school libraries. In addition, many colleges and universities have a prelaw advisor who counsels undergraduates about their course work, the LSAT, law school applications, and other matters.

Information on law schools, financial aid for law students, and law as a career is available from:

American Bar Association, Information Services, 1155 East 60th St., Chicago, Ill. 60637. (There may be a slight charge for publications.)

For information on the placement of law graduates and the legal profession in general, contact:

National Association for Law Placement, 3200 Fifth Avenue, Sacramento, California 95817.

Information on legal education is available from:

Association of American Law Schools, 1 Dupont Circle NW., Suite 370, Washington, D.C. 20036.

For advice on financial aid, contact a law school financial aid officer.

The specific requirements for admission to the bar in a particular State may be obtained at the State capital from the clerk of the Supreme Court or the Secretary of the Board of Bar Examiners.

Librarians

(D.O.T. 100 except 100.367-018)

Nature of the Work

Librarians make information available to people. They serve as a link between the public and the millions of sources of information by selecting and organizing materials and making them accessible.

Library work is divided into two areas: user services and technical services. Librarians in user services—for example, reference and children's librarians—work directly with the public helping them find the information they need. Librarians in technical services—such as acquisitions librarians—are primarily concerned with acquiring and preparing materials for use and deal less frequently with the public.

The size of the library affects the scope of a librarian's job. In small libraries, librarians generally handle both user and technical services. They select, purchase, and process library materials; publicize services; provide reference help to groups and individuals; supervise the support staff; prepare the budget; and oversee other administrative matters. In large libraries, librarians work in a single area, such as acquisitions, cataloging, bibliography, reference, circulation, or administration. Or they may handle special collections.

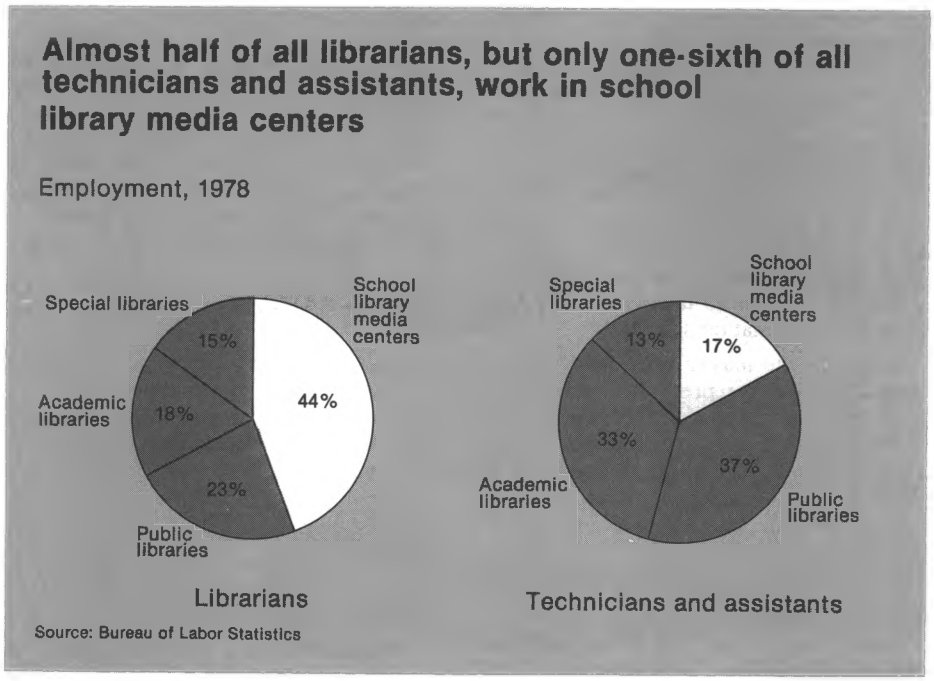
Building and maintaining a strong collection is essential in any library, large or small. *Acquisitions librarians* (D.O.T. 100.267-010) select and order books, periodicals, films, and other materials that suit users' needs. To keep abreast of current literature, they read book reviews, look over publishers' announcements and catalogs, confer with booksellers, and seek advice from library users. A knowledge of book publishing and business acumen are important, for these librarians are under pressure to get as much for their money as possible.

After library materials have been received, other librarians prepare them for use. *Classifiers* (D.O.T. 100.367-014) classify library materials by subject matter. They may skim through a book quickly to be sure what it is about, then assign a classification number. *Catalogers* (D.O.T. 100.387-010) then supervise assistants who prepare cards that indicate the book's title, author, subject, publisher, and date of publication. The cards are then filed in the card catalog.

Bibliographers (D.O.T. 100.367-010), who usually work in research libraries, compile lists of books, periodicals, articles, and audiovisual materials on particular subjects. They also recommend materials to be acquired in subject areas with which they are familiar. *Special collections librarians* (D.O.T. 100.-267-014) collect and organize books, pamphlets, manuscripts, and other materials in a specific field, such as rare books, genealogy, or music. From time to time, they may prepare reports to inform scholars about important additions to the collection.

Librarians are also classified according to the type of library in which they work: Public libraries, school library media centers, academic libraries, and special libraries.

Public librarians serve people of all ages and from all walks of life. Increasingly, public librarians provide special materials and services to culturally and educationally deprived persons, and to persons who, because



of physical handicaps, cannot use conventional print.

The professional staff of a large public library system may include the chief librarian, an assistant chief, and division heads who plan and coordinate the work of the entire system. The system also may include librarians who supervise branch libraries and specialists in areas such as acquisitions, cataloging, and special collectons.

Some public librarians work with specific groups of readers. *Children's librarians* (D.O.T. 100.167-018) serve young people by finding books they will enjoy and showing them how to use the library. They may plan and conduct special programs such as story hours or film programs. In serving children they often work with school and community organizations. *Adult services librarians* suggest materials suited to the needs and interests of adults. They may cooperate in planning and conducting education programs, such as community development, public affairs, creative arts, problems of the aging, and home and family. *Young adult librarians* (D.O.T. 100.167-034) help junior and senior high school students select and use books and other materials. They may organize programs of interest to young adults, such as book or film discussions or concerts of recorded music. They also may coordinate the library's work with school programs. *Community outreach librarians* and *bookmobile librarians* (D.O.T. 100.167-014) develop library services to meet the needs of special groups within the community. They might arrange for books to be brought to a migrant labor camp, an inner city housing project, or a nursing home, for example.

School librarians (D.O.T. 100.167-030) teach students how to use the school library media center and help them choose from its collection of print and nonprint materials. Working with teachers and supervisors, school librarians familiarize students with the library's resources. They prepare lists of materials on certain subjects and help select materials for school programs. They also select, order, and organize the library's materials. Increasingly, the school library media center is viewed as an integral part of the school's overall instructional program, and many school librarians work closely with classroom teachers. They assist teachers in developing units of study or independent study programs and participate in team teaching.

Very large high schools may employ several school librarians, each responsible for a particular aspect of the library program or for a special subject area. *Media specialists* and *audiovisual librarians*, for example, develop audiovisual programs to be included in or to supplement the curriculum. They also may develop materials and work with teachers on curriculum.

Academic librarians serve students, faculty members, and researchers in colleges and universities. They work closely with members of the faculty to ensure that the general collection includes reference materials required for the hundreds of courses that might be offered during a particular academic year. They also maintain the quality of the collection in research areas for which the institution is noted.

Special librarians (D.O.T. 100.167-026) work in libraries maintained by government agencies and by commercial and industrial firms, such as pharmaceutical companies, banks, law firms, advertising agencies, medical centers, and research laboratories. They provide materials and services covering subjects of special interest to the organization. They build and arrange the organization's information resources to suit the needs of the library users. Special librarians assist users and may conduct literature searches, compile bibliographies, or prepare abstracts. In scientific and technical libraries in particular, computerized data bases are an important and much-used part of the collection. Maintaining these, and assisting users in retrieving information that has been stored in a computer's memory, are increasingly important parts of the special librarian's job.

The staff of a technical library or documentation center may also include *information science specialists*. Although they work closely with special librarians, information science specialists must possess a more extensive technical and scientific background and a knowledge of various techniques for handling information. They abstract complicated information into condensed, readable

Children's librarians often conduct special programs such as story hours for youngsters.

form, and interpret and analyze data for a highly specialized clientele. Among other duties, they develop classification systems, prepare coding and programing techniques for computerized information storage and retrieval systems, design information networks, and develop microfilm technology.

Working Conditions

Librarians should enjoy working with data as well as people. To make decisions about library matters without supervision, they need to be responsible and thoughtful. Physically, the job may require much standing, stooping, bending, and reaching.

Librarians typically work a 5-day, 35-40 hour week. Public and college librarians may work some weekends and evenings. School librarians generally have the same workday schedule as classroom teachers. A 40-hour week during normal business hours is common for government and other special librarians.

Places of Employment

An estimated 142,000 professional librarians were employed in 1978. School librarians accounted for more than two-fifths of all librarians. Public librarians accounted for almost one-fourth of the total, while colleges and universities employed about one-sixth. Another sixth worked in special libraries, including those in private industry, in government agencies, and in institutions such as hospitals and correctional facilities. A small number served as consultants, as State and Federal Government administrators, and as faculty in schools of library science. In late 1977, the Federal Government employed about 3,300 professional librarians.

Most librarians work in cities and towns. Those attached to bookmobile units serve widely scattered population groups.

Training, Other Qualifications, and Advancement

In most cases, a master's degree in library science is necessary to obtain a job as a librarian. Although about 120 schools offered such degrees in 1977, most employers prefer graduates from one of the 67 library schools accredited by the American Library Association. Public school libraries in the State in which the librarian has received training may be an exception, since most States have their own certification requirements for public school librarians.

Most graduate schools of library science require graduation from an accredited 4-year college or university and a good undergraduate record. In addition, some schools require a reading knowledge of at least one foreign language. Some schools also require introductory undergraduate courses in library science. Many prefer a liberal arts background with a major in an area such as the social sciences, the arts, or literature. Some schools require entrance examinations.

A typical graduate program in library science includes basic courses in information storage and retrieval, reference tools and serving the user, materials selection, and the foundations of librarianship. Also included are advanced courses in resources, including resources for special groups such as children or young adults; in the administrative aspects of librarianship; in technical areas such as cataloging, indexing, and abstracting; and in library automation. As automation becomes increasingly important, many library schools encourage students to take courses in computer and information science.

Although the master's of library science (M.L.S.) program represents a general, all-round preparation for library work, some people specialize in a particular area such as archives, media, or children's literature. A few M.L.S. degree holders return to school to receive a certificate of advanced study. For those interested in the special libraries field, a master's degree or doctorate in the library's specialization is highly desirable.

Most States require that public school librarians be certified and trained both as teachers and librarians. They also may require that media specialists, for example, specialize in media within the M.L.S. program. Some States require certification of public librarians employed in areas such as municipal, county, or regional library systems. The specific education and experience necessary for certification vary according to State and the school district. The local superintendent of schools and the State department of education can provide information about specific requirements in an area.

In the Federal Government, beginning positions require completion of a 4-year college course and a master's degree in library science, or demonstration of the equivalent in experience and education by a passing grade on an examination.

Under cooperative work-study programs, library schools combine the academic program with practical work experience in a library. Scholarships for training in library science are available under certain State and Federal programs, from library schools, and from a number of the large libraries and library associations. Loans, assistantships, and financial aid also are available.

Many employers now require several years' experience for what used to be entry level positions. Graduates who have participated in internship programs and work-study programs or who have worked part time may have an employment advantage over other new graduates.

Experienced librarians, primarily those who have specialized or completed graduate training in a library school, may advance to administrative positions or to specialized work. A second master's degree in business or public administration may help to obtain such positions. A Ph.D. degree in library science is advantageous for a teaching career in library schools or for a top administrative post, particularly in a college or university library or in a large library system.

Employment Outlook

The employment outlook for librarians is expected to remain very competitive through the 1980's. Although library school enrollments are expected to decline, the number of new graduates and labor force reentrants seeking jobs probably will exceed openings. Most job openings in libraries during the 1980's will result from replacement needs.

Employment growth in public libraries is likely to be slower than it has been during the last two decades. Faced with escalating materials costs and tighter operating budgets, many libraries are expected to increase their use of support staff and volunteers, which will slow employment growth for librarians.

Virtually no growth is foreseen for academic librarians, a reflection of the overall decline in college enrollments expected during the 1980's. The situation will vary from institution to institution, however.

In school libraries, a large sector, very modest growth is foreseen. Elementary and secondary enrollments are expected to remain relatively stable through the 1980's.

Opportunities will be best for librarians with scientific and technical backgrounds, particularly in private libraries in the health sciences. The expanding use of computers to store information and to handle routine operations such as ordering and cataloging will sustain the demand for information and automation specialists.

The development of new information handling jobs outside the traditional library setting is also expected to offer employment opportunities for imaginative librarians who can persuade prospective employers in government and private industry of the need for their services.

Persons who are geographically mobile will face better employment prospects than those limited to one area.

Earnings

Salaries of librarians vary by type of library, the individual's qualifications, and the size and geographical location of the library.

Starting salaries of graduates of library school master's degree programs accredited by the American Library Association averaged $11,894 a year in 1977, and ranged from $10,929 in public libraries to $12,194 in school libraries. The median salary for librarians in college and university libraries was $16,930 in 1978. Average salaries ranged from $12,871 a year for those with less than 5 years of experience to over $38,700 for directors of libraries. In general, librarians earned twice as much as the average for all nonsupervisory workers in private industry, except farming. Librarians in the Federal Government averaged about $21,900 in 1978.

The usual paid vacation after a year's service is 3 to 4 weeks. Vacations may be longer

in school libraries and somewhat shorter in those operated by business and industry. Many librarians are covered by sick leave; life, health, and accident insurance; and pension plans.

Related Occupations

Librarians play an important role in the communication of ideas by providing people with access to the information they need and want. Jobs requiring similar analytical, organizational, and communicative skills include archivists, information scientists, museum curators, publisher's representatives, research analysts, information brokers, book critics, and records managers.

Sources of Additional Information

Additional information on librarianship, including a listing of accredited education programs and information on scholarships or loans, may be obtained from:

American Library Association, 50 East Huron St., Chicago, Ill. 60611.

For information on a career as a special librarian, write to:

Special Libraries Association, 235 Park Ave., South, New York, N.Y. 10003.

Information on Federal assistance for graduate school library training under the Higher Education Act of 1965 is available from:

Office of Libraries and Learning Resources, Office of Education, U.S. Department of Education, Washington, D.C. 20202.

Those interested in a career in Federal libraries should write to:

Office of Personnel Management, 1900 E St., NW., Washington, D.C. 20415.

Material about a career in information science may be obtained from:

American Society for Information Science, 1110 16th St., NW., Washington, D.C. 20036.

Information on graduate schools of library and information science can also be obtained from:

Association of American Library Schools, 471 Park Lane, State College, Pa. 16801.

Individual State library agencies can furnish information on scholarships available through their offices, requirements for certification, and general information about career prospects in their regions. State boards of education can furnish information on certification requirements and job opportunities for school librarians.

Life Scientists

(D.O.T. 040.061, except -034, -046, -054 and -058; 041.061 except -026; and 041.261-010)

Nature of the Work

Life scientists, who study all aspects of living organisms, emphasize the relationship of animals and plants to their environment.

About one-third of all life scientists are primarily involved in research and development. Many conduct basic research to increase our knowledge of living organisms which can be applied in medicine, in increasing crop yields, and in improving the natural environment. When working in laboratories, life scientists must be familiar with research techniques and laboratory equipment such as electron microscopes. Knowledge of computers also is useful in conducting experiments. Not all research, however, is performed in laboratories. For example, a botanist who explores the volcanic Alaskan valleys to see what plants grow there also is doing research.

More than one-fifth of all life scientists work in management or administration ranging from planning and administering programs for testing foods and drugs to directing activities at zoos or botanical gardens. About one-fifth teach in colleges or universities; many also do independent research. Some life scientists work as consultants to business firms or to government in their areas of specialization. Others write for technical publications or test and inspect foods, drugs, and other products. Some work in technical sales and services jobs for industrial companies where, for example, they demonstrate the proper use of new chemicals or technical products.

Scientists in many life science areas often call themselves *biologists* (D.O.T. 041.061-030). However, the majority are classified by the type of organism they study or by the specific activity they perform.

Botanists (D.O.T. 041.061-038) deal primarily with plants and their environment. Some study all aspects of plant life, while others work in specific areas such as identifying and classifying plants or studying the structure of plants and plant cells. Other botanists concentrate on causes and cures of plant diseases.

Agronomists (D.O.T. 040.061-010), who are concerned with the mass development of plants, improve the quality and yield of crops, such as corn, wheat, and cotton, by developing new growth methods or by controlling diseases, pests, and weeds. They also analyze soils to determine ways to increase acreage yields and decrease soil erosion. *Horticulturists* (D.O.T. 040.061-038) work with orchard and garden plants such as fruit and nut trees, vegetables, and flowers. They seek to improve plant culture methods for the beautification of communities, homes, parks, and other areas as well as for increasing crop quality and yields.

Zoologists (D.O.T. 041.061-090) study various aspects of animal life—its origin, behavior, and life processes. Some conduct experimental studies with live animals in controlled or natural surroundings while others dissect animals to study the structure of their parts. Zoologists are usually identified by the animal group studied—ornithologists (birds), entomologists (insects), and mammalogists (mammals).

Animal scientists (D.O.T. 040.061-014) do research on the breeding, feeding, and diseases of domestic farm animals. *Veterinarians* (D.O.T. 073-061) study diseases and abnormal functioning in animals. (See statement on veterinarians elsewhere in the *Handbook*.)

Anatomists (D.O.T. 041.061-010) study the structure of organisms, from cell structure to the formation of tissues and organs. Many specialize in human anatomy. Research methods may entail dissections or the use of electron microscopes.

Some life scientists apply their specialized knowledge across a number of areas, and may be classified by the functions performed. *Ecologists*, for example, study the relationship between organisms and their environments, particularly the effects of environmental influences such as rainfall, temperature, and altitude on organisms. For example, ecologists extract samples of plankton (microscopic plants and animals) from bodies of water to determine the effects of pollution, and measure the radioactive content of fish.

Embryologists study the development of an animal from a fertilized egg through the hatching process or gestation period. They investigate the causes of healthy and abnormal development in animals.

Microbiologists (D.O.T. 041.061-058) are life scientists who investigate the growth and characteristics of microscopic organisms such as bacteria, viruses, and molds. They isolate and grow organisms for close examination under a microscope. *Medical microbiologists* are concerned with the relationship between bacteria and disease or the effect of antibiotics on bacteria. Other microbiologists may specialize in soil bacteriology (effect of microorganisms on soil fertility), virology (viruses), or immunology (mechanisms that fight infections).

Physiologists (D.O.T. 041.061-078) study how the various life functions of plants and animals work under normal and abnormal conditions. Physiologists may specialize in functions such as growth, reproduction, respiration, or movement, or in the physiology of a certain body area or system.

Pharmacologists (D.O.T. 041.061-074) and *toxicologists* conduct tests on animals such as rats, guinea pigs, and monkeys to determine the effects of drugs, gases, poisons, dusts, and other substances on the functioning of tissues and organs. Pharmacologists may develop new or improved drugs and medicines.

Pathologists specialize in the effects of diseases, parasites, and insects on human cells, tissues, and organs. Others may investigate genetic variations caused by drugs.

Biochemists and biological oceanographers, who are also life scientists, are included in separate statements elsewhere in the *Handbook*.

Working Conditions

Life scientists generally work regular hours in offices, laboratories, or classrooms and usually are not exposed to unsafe or unhealthy conditions. Some life scientists such as botanists, ecologists, and zoologists may take field trips which may involve strenuous physical labor and primitive living conditions.

Places of Employment

An estimated 215,000 persons worked as life scientists in 1978. Almost 40,000 were agricultural scientists, over 110,000 were biological scientists, and about 65,000 were medical scientists.

Colleges and universities employ nearly three-fifths of all life scientists, in both teaching and research jobs. Medical schools and hospitals also employ large numbers of medical investigators. Sizable numbers of specialists in agronomy, horticulture, animal husbandry, entomology, and related areas work for State agricultural colleges and agricultural experiment stations.

About 15,000 life scientists worked for the Federal Government in 1978. Of these, almost half worked for the Department of Agriculture, with large numbers also in the Department of the Interior and in the National Institutes of Health. State and local governments combined employed about 22,000 life scientists.

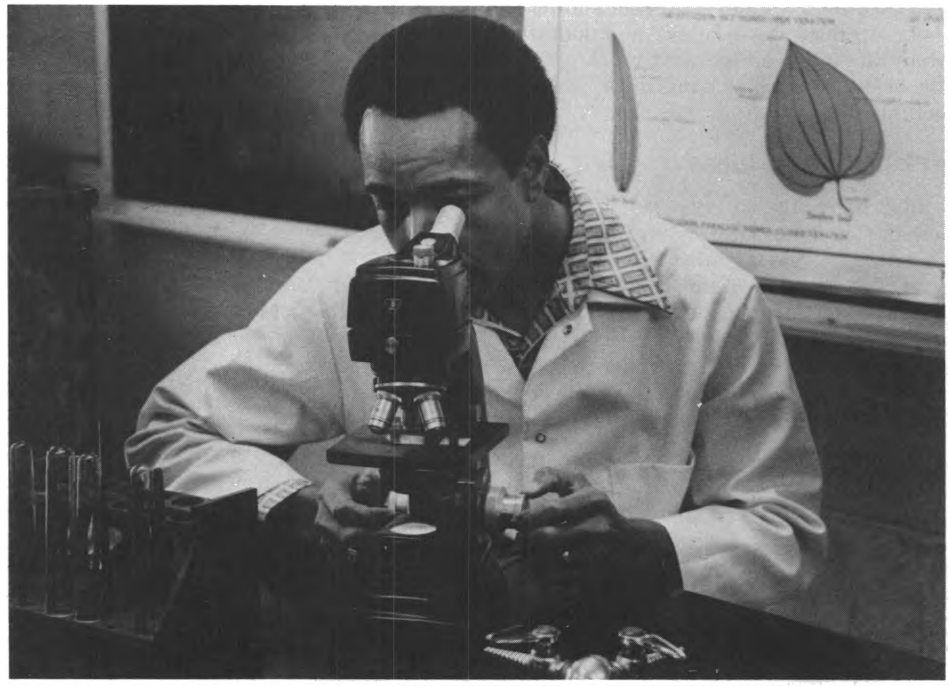
Approximately 40,000 life scientists worked in private industry, mostly in the pharmaceutical, industrial chemical, and food processing industries in 1978. About 6,000 worked for nonprofit research organizations and foundations; a few were self-employed.

Life scientists are distributed fairly evenly throughout the United States, but employment is concentrated in some metropolitan areas—for example, nearly 6 percent of all agricultural and biological scientists work in the Washington, D.C., metropolitan area. Life science teachers are concentrated in communities with large universities.

Training, Other Qualifications, and Advancement

Persons seeking a career in the life sciences should plan to obtain an advanced degree. The Ph. D. degree generally is required for college teaching, for independent research, and for many administrative jobs. A master's degree is sufficient for some jobs in applied research and college teaching. A health science degree is necessary for some jobs in medical research. (See section on health occupations elsewhere in the *Handbook*.)

The bachelor's degree is adequate preparation for some beginning jobs, but promotions often are limited for those who hold no higher degree. New graduates with a bachelor's degree can start their careers in testing and inspecting jobs, or become technical sales and service representatives. They also may become advanced technicians, particularly in medical research or, with courses in education, a high school biology teacher. (See statement on secondary school teachers elsewhere in the *Handbook*.)



Life scientists study living organisms and their life processes.

Most colleges and universities offer life science curriculums. However, different schools may emphasize only certain areas of life science. For example, liberal arts colleges may emphasize the biological sciences, while many State universities and land-grant colleges offer programs in agricultural science.

Students seeking careers in the life sciences should obtain the broadest possible undergraduate background in biology and other sciences. Courses taken should include biology, chemistry, physics, and mathematics.

Many colleges and universities confer advanced degrees in the life sciences. Requirements for advanced degrees usually include field work and laboratory research as well as classroom studies and preparation of a thesis.

Prospective life scientists should be able to work independently or as part of a team and must be able to communicate their findings in clear and concise language, both orally and in writing. Some life scientists, such as those conducting field research in remote areas, must have stamina.

Life scientists who have advanced degrees usually begin in research or teaching jobs. With experience, they may advance to jobs such as supervisors of research programs.

Employment Outlook

Employment opportunities for life scientists are expected to be good for those with advanced degrees through the 1980's, but those with lesser degrees may experience competition for available jobs. However, a life science degree also is useful for entry to occupations related to life science such as laboratory technology and the health care occupations. Employment in the life sciences is expected to increase faster than the average for all occupations over this period. In addition, job openings will occur as life scientists retire, die, or transfer to other occupations.

Employment in the life sciences is expected to grow as a result of increased attention to preserving the natural environment and a continuing interest in medical research. Employment opportunities in industry and government should grow as environmental research and development increase and new laws and standards protecting the environment are enacted. The Toxic Substances Control Act is creating many new openings for toxicologists and other life scientists who are skilled in testing for cancer-causing substances. Additional life science teachers will be needed if college and university enrollments increase as expected.

Earnings

Life scientists receive relatively high salaries; their average earnings are more than twice those of nonsupervisory workers in private industry, except farming.

According to the College Placement Council surveys, beginning salary offers in private industry in 1978 averaged $11,500 a year for bachelor's degree recipients in agricultural science and $12,400 a year for bachelor's degree recipients in biological science.

In the Federal Government in 1979, life scientists having a bachelor's degree could

begin at $10,507 or $13,014 a year, depending on their college records. Life scientists having the master's degree could start at $13,014 or $15,920, depending on their academic records or work experience. Those having the Ph. D. degree could begin at $19,263 or $23,087 a year. Agricultural and biological scientists in the Federal Government averaged $23,800 a year.

Salaries paid to college and university life science teachers are comparable to those paid to other faculty members. (See statement on college and university faculty elsewhere in the *Handbook.)* Life scientists who have the M.D. degree generally earn more than other life scientists but less than physicians in private practice.

Related Occupations

Many occupations are related in some way to life science since they deal with living organisms. These occupations include the conservation occupations of forester, forestry technician, range mananger and soil conservationist, as well as biochemist, soil scientist, oceanographer, and life science technician. The wide array of health occupations are all related to life science, as are occupations dealing with raising plants and animals such as farmer and farm worker, florist, and nursery worker.

Sources of Additional Information

General information on careers in the life sciences is available from:

American Institute of Biological Sciences, 1401 Wilson Boulevard, Arlington, Va. 22209.

American Society for Horticultural Science, 70 North Saint Asaph St., Alexandria, Va. 22314.

American Physiological Society, Education Office, 9650 Rockville Pike, Bethesda, Md. 20014.

Information on Federal job opportunities is available from State Employment Service offices or from U.S. Office of Personnel Management area offices or Federal Job Information Centers located in various large cities throughout the country.

Manufacturers' Sales Workers

(D.O.T. 260 through 279.357)

Nature of the Work

Practically all manufacturers—whether they make computers or can openers—employ sales workers. Manufacturers' sales workers sell mainly to other businesses—factories, railroads, banks, wholesalers, and retailers. They also sell to hospitals, schools, libraries, and other institutions.

Most manufacturers' sales workers sell nontechnical products. They must be well informed about their firms' products and also about the special requirements of their customers. When sales workers visit firms in their territory, they use an approach adapted to the particular line of merchandise. A sales worker who handles crackers or cookies, for example, emphasizes the wholesomeness, attractive packaging, and variety of these products. Sometimes sales workers promote their products by displays in hotels and conferences with wholesalers and other customers.

Sales workers who deal in highly technical products, such as electronic equipment, often are called sales engineers or industrial sales workers. In addition to having a thorough knowledge of their firms' products, they must be able to help prospective buyers with technical problems. For example, they may try to determine the proper materials and equipment for a firm's manufacturing process. They then present this information to company officials and try to negotiate a sale, which may take many months. Often, sales engineers work with the research-and-development departments of their own companies to devise ways to adapt products to a customer's specialized needs. Sales workers who handle technical products sometimes train their customers' employees in the operation and maintenance of new equipment, and make frequent return visits to be certain that it is giving the desired service.

Although manufacturers' sales workers spend most of their time visiting prospective customers, they also do paperwork, including reports on sales prospects or customers' credit ratings. In addition, they must plan their work schedules, draw up lists of prospects, make appointments, handle some correspondence, and study literature relating to their products.

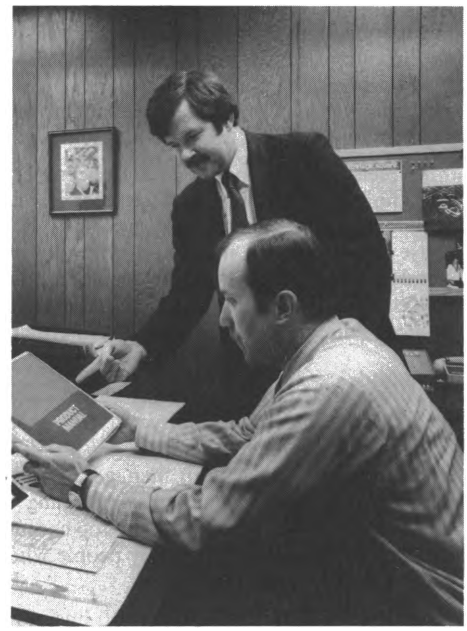
Working Conditions

Some manufacturers' sales workers have large territories and do considerable traveling. Others usually work in the neighborhood of their "home base." When on business trips, sales workers are reimbursed for expenses such as transportation and hotels. Some companies provide a car or pay a mileage allowance to sales workers who use their own cars.

Manufacturers' sales workers call at the time most convenient to customers and may have to travel at night or on weekends. Frequently, they spend evenings writing reports. However, some plan their schedules for time off when they want it. Most sales workers who are not paid a straight commission receive 2 to 4 weeks' paid vacation, depending on their length of service. They usually share in company benefits, including life insurance, pensions, and hospital, surgical, and medical benefits.

Places of Employment

Over 400,000 people were manufacturers' sales workers in 1978. About 16,000 of them were sales engineers. Some work out of their company's home office, often located at a manufacturing plant. The majority, however, work out of branch offices, usually in big cities near prospective customers.



Manufacturers' sales workers must be well informed about their firms' products.

More sales workers are employed by companies that produce food products than by any other industry. Large numbers also work in the printing and publishing, chemical, fabricated metal products, and electrical and other machinery industries. Most sales engineers work for companies that produce heavy machinery, transportation equipment, fabricated metal products, and professional and scientific instruments.

Training, Other Qualifications, and Advancement

Although a college degree is increasingly desirable, the type and level of education a sales worker needs depend largely on the product and its market.

Manufacturers of nontechnical products often hire college graduates who have a degree in liberal arts or business administration. Some positions, however, require specialized training. Drug sales workers, also known as pharmaceutical detailers, usually need training at a college of pharmacy. Manufacturers of electrical equipment, heavy machinery, and some types of chemicals prefer to hire people who have studied engineering or chemistry. (Information on chemists, engineers, and others with the technical training suitable for work as manufacturers' sales workers is given elsewhere in the *Handbook*.)

Beginning sales workers may take specialized training before they start on the job. Some companies, especially those that manufacture complex technical products, have formal training programs that last 2 years or longer. In some of these programs, trainees rotate among jobs in several departments of

the plant and office to learn all phases of production, installation, and distribution of the product. Other trainees take formal class instruction at the plant, followed by on-the-job training in a branch office under the supervision of a field sales manager.

A pleasant personality and appearance, and the ability to meet and get along well with many types of people are important. Because sales workers may have to walk or stand for long periods or carry product samples, some physical stamina is necessary. As in most selling jobs, arithmetic skills are an asset.

Sales representatives who have good sales records and leadership ability may advance to sales supervisors, branch managers, or district managers. Those with managerial ability eventually may advance to sales manager or other executive positions; many top executive jobs in industry are filled by people who started as sales workers.

Because of frequent contact with business people in other firms, sales workers often are able to transfer to other jobs. Some go into business for themselves as independent representatives. Other experienced sales workers find opportunities in advertising and marketing research.

Employment Outlook

Employment in this field is expected to grow about as fast as the average for all occupations through the 1980's because of the rising demand for technical products and the resulting need for trained sales workers. In addition, industrial firms, chainstores, and institutions that purchase large quantities of goods at one time frequently buy directly from the manufacturer. The need for sales workers will increase as manufacturers emphasize sales activities to compete for the growing number of these valuable accounts.

In addition to the jobs that will be created by growth, many openings will occur each year because of the need to replace workers who die, retire, or leave the occupation. As is the case in other sales jobs, turnover is fairly high. Each year, a number of new manufacturers' sales workers discover that they are not cut out for selling and leave the occupation.

Overall, opportunities are expected to be good for persons with appropriate product knowledge or technical expertise, plus the personal traits necessary for successful selling.

Earnings

According to the limited information available, salaries for inexperienced sales workers ranged from $15,400 to over $22,500 a year in 1978. The highest starting salaries generally were paid by manufacturers of textile mill products, printing and allied products, and apparel and finished products. The average experienced sales worker earned between $19,200 and $38,500 in 1978, depending upon the firm and its product. The highest paid sales workers sometimes earned upwards of $49,500 and $57,200.

Some manufacturing concerns pay experienced sales workers a straight commission, based on the dollar amount of their sales (as in the case of independent representatives); others pay a fixed salary. The majority, however, use a combination of salary and commission, salary and bonus, or salary, commission, and bonus. Commissions vary according to the sales workers' efforts and ability, the commission rate, the location of their sales territory, and the type of product sold. Bonus payments may depend on individual performance, on performance of all sales workers in the group or district, or on the company's sales. Some firms pay annual bonuses; others offer bonuses as incentive payments on a quarterly or monthly basis.

Related Occupations

Sales workers must have a knowledge of sales techniques and a specific knowledge of the products they sell. Some related occupations that employ these same skills are buyers, comparison shoppers, field-contact technicians, and wholesale trade sales workers.

Sources of Additional Information

For more information on the occupation of manufacturers' sales worker, write:

Sales and Marketing Executives International, Career Education Division, 380 Lexington Ave., New York, N.Y. 10017.

Manufacturers' Agents National Association, P.O. Box 16878, Irvine, Calif. 92713.

Marketing Research Workers

(D.O.T. 050.067-014)

Nature of the Work

If a business is to be successful, it must provide a product or service people will buy. Yet, persuading people to spend their money requires more than simply offering a useful or desirable item. People try a product for many reasons in addition to basic utility. They consider price, of course, as well as convenience, appearance, and a trusted name. For some products, reliability and ease of maintenance are most important. Very often, it is the product's image—created by advertisements, sales promotion, and the type of store in which it is sold—that influences people.

Business executives have to make decisions concerning all these areas when they put a product or service on the market. Other organizations, whether they are asking the public to volunteer their time, contribute to a charity, or even spend a vacation in their State, must make similar decisions. Marketing research workers analyze the buying public and its wants and needs, thus providing the information on which these marketing decisions can be based.

Most marketing research starts with a collection of data and information about products or services and the people who are likely to buy the product or service. For example, if the researcher's task is to find out why a company's frozen foods are not selling well in a certain city, he or she may start by studying the company's current marketing strategy to see if it matches consumers' needs. Is the company shipping foods that suit the tastes of most people in the city? Is the price reasonable for the income of most people in the area? Does the distributor deliver the food to the stores in good condition? Is the company advertising its products and are the ads seen by the people most likely to buy them? Is the company's sales force well trained and actively promoting the product to the stores? Are the stores providing good shelf space or are the boxes of food in a corner of the freezer where they may be overlooked? By investigating these and other issues, marketing research workers determine what actions should be taken. They may conclude, for example, that sales would improve substantially with an increased newspaper advertising campaign, or perhaps that the company should pull out completely and concentrate its efforts in other sections of the country where the product is more successful.

Since the goal of marketing is to satisfy the consumer, research workers often are concerned with finding out customers' opinions and tastes. They conduct telephone, personal, or mail surveys, and sometimes offer samples of a product to find out whether potential customers are pleased with the design and satisfied with the price.

Marketing researchers employed by large organizations often work with statisticians who help them select a group of people to be interviewed who will accurately represent prospective customers, and "motivational research" specialists who design survey questions that produce in depth reliable information. Trained interviewers then conduct the survey, and office workers tabulate the results under the direction of marketing research workers.

In contrast to surveys for consumer goods, researchers for business and industrial firms often conduct the interviews themselves to gather opinions of the products. They also may speak to company officials about new uses for it. Therefore, they must have a thorough knowledge of both marketing techniques and the industrial uses of the product.

Working Conditions

Marketing research workers usually work in modern, centrally located offices. Some, especially those employed by independent research firms, may travel for their work. Also, they may have to work long hours, including nights and weekends, when working to meet deadlines.

Marketing research workers use all kinds of media to determine customer preference.

Places of Employment

About 24,000 full-time marketing research workers were employed in 1978. Most jobs for marketing research workers are found in manufacturing companies, advertising agencies, and independent research organizations. Large numbers are employed by stores, radio and television firms, and newspapers; others work for university research centers and government agencies. Marketing research organizations range in size from one-person enterprises to firms with a hundred employees or more.

A large number of marketing research workers are employed in New York City where major advertising agencies, independent marketing organizations, and central offices of large manufacturers are located. Chicago has another large concentration. However, marketing research workers are employed in many other cities as well—wherever there are central offices of large manufacturing and sales organizations.

Training, Other Qualifications, and Advancement

Although a bachelor's degree usually is sufficient for trainees, graduate education is necessary for many specialized positions in marketing research. Graduate study usually is required for advancement, and a sizable number of market researchers have a master's degree in business administration or other graduate degree in addition to a bachelor's degree in marketing. Some people qualify for jobs through previous experience in other types of research; university professors of marketing or statistics, for example, may be hired to head marketing research departments in business firms or advertising agencies.

Bachelor's programs in marketing and related fields, including courses in statistics, English composition, communications, psychology, sociology, and economics, are valuable preparation for work in marketing research. Some marketing research positions require specialized skills such as engineering, or substantial sales experience and a thorough knowledge of the company's products. Knowledge of data processing is helpful for sales forecasting, distribution, and cost analysis.

College graduates may find their first job in any of a number of places: The market research department of a large company, a research firm, an advertising agency, a government planning agency, or even a university marketing department.

Trainees usually start as research assistants or junior analysts. At first, they may do considerable clerical work, such as copying data from published sources, editing and coding questionnaires, and tabulating survey returns. They also learn to conduct interviews and write reports on survey findings. As they gain experience, assistants and junior analysts may assume responsibility for specific marketing research projects, or advance to supervisory positions. An exceptionally able worker may become marketing research director or vice president for marketing or sales.

Either alone or as part of a team, marketing research workers must be able to analyze problems objectively and apply various techniques to their solution. As advisers to management, they should be able to write clear reports informing company officials of their findings.

Employment Outlook

Opportunities should be best for applicants with graduate training in marketing research or statistics. The growing complexity of marketing research techniques also may expand opportunities in this field for psychologists, economists, and other social scientists.

Marketing research employment rises as new products and services are developed, particularly when business activity and personal incomes are expanding rapidly. In periods of slow economic growth, however, the reduced demand for marketing services may limit the hiring of research workers.

Over the long run, population growth and the increased variety of goods and services that businesses and individuals will require are expected to stimulate a high level of marketing activity. As a result, employment of marketing reserch workers is expected to grow much faster than the average for all occupations through the 1980's.

Competition among manufacturers of both consumer and industrial products will make the appraising of marketing situations increasingly important. As techniques improve

and statistical data accumulate, company officials are likely to turn more often to marketing research workers for information and advice.

Earnings

Salaries of beginning marketing researchers were about $14,000 a year in 1978, according to the limited information available. Persons with master's degrees in business administration and related fields usually started with salaries of about $18,000 a year. Starting salaries varied according to the type, size, and location of the firm as well as the exact nature of the position. Generally, though, starting salaries were somewhat higher but promotion somewhat slower than in other occupations requiring similar training.

Experienced workers such as senior analysts received salaries of over $24,000 a year. Earnings were highest, however, for workers in management positions of great responsibility. Directors of marketing research earned well over $35,000 a year in 1978.

Related Occupations

Besides marketing research workers, many others are involved in social research—including the planning, implementation, and analysis of surveys to learn more about people's wants and needs. Some of these workers include economists, employment research and planning directors, social welfare research workers, political scientists, urban planners, sociologists, developmental psychologists, and experimental pyschologists.

Sources of Additional Information

A pamphlet, "Careers in Marketing" (Monograph Series No. 4), may be obtained from:

American Marketing Association, 222 South Riverside Plaza, Chicago, Ill. 60606.

Mathematicians

(D.O.T. 020.067-014)

Nature of the Work

Mathematicians work in one of the oldest and most vital of all sciences. Mathematicians today are engaged in a wide variety of activities, ranging from the creation of new theories to the translation of scientific and managerial problems into mathematical terms.

Mathematical work falls into two broad classes: Theoretical (pure) mathematics; and applied mathematics. However, these classes are not sharply defined and often overlap.

Theoretical mathematicians advance mathematical science by developing new principles and new relationships between existing principles of mathematics. Although they seek to increase basic knowledge without necessarily considering its practical use, this pure and abstract knowledge has been instrumental in producing many scientific and engineering achievements. For example, in 1854 Bernard Riemann invented a seemingly impractical non-Euclidian geometry that was to become part of Albert Einstein's theory of relativity. Years later, this theory contributed to the creation of atomic power.

Applied mathematicians use mathematics to develop theories, techniques, and approaches to solve practical problems in business, government, engineering, and the natural and social sciences. Their work ranges from analysis of the mathematical aspects of launching Earth satellites to studies of the effects of new drugs on disease.

Much work in applied mathematics, however, is carried on by persons other than mathematicians. In fact, the number of workers who depend upon mathematical expertise is many times greater than the number actually designated as mathematicians.

Working Conditions

Mathematicians work almost exclusively in offices and classrooms. Most work regular hours and travel infrequently.

Places of Employment

About 33,000 persons worked as mathematicians in 1978. Roughly three-fourths of all mathematicians worked in colleges and universities. Most were teachers; some worked mainly in research and development with few or no teaching duties.

Most other mathematicians worked in private industry and government. In the private sector, major employers were the aerospace, communications, machinery, and electrical equipment industries. The Department of Defense and the National Aeronautics and Space Administration employed most of the mathematicians working in the Federal Government.

Mathematicians work in all States, but are concentrated in those with large industrial areas and large college and university enrollments.

Training, Other Qualifications, and Advancement

An advanced degree is the basic requirement for beginning teaching jobs, as well as for most research positions. In most colleges and universities, the Ph. D. degree is necessary for full faculty status.

Although the bachelor's degree may be adequate preparation for some jobs in private industry and government, employers usually require an advanced degree. Those bachelor's degree holders who find jobs usually assist senior mathematicians by performing computations and solving less advanced problems in applied mathematics. However, advancement often depends on achieving an advanced degree. Other bachelor's degree holders work as research or teaching assistants in colleges and universities while studying for an advanced degree. Many bachelor's degree holders work in related fields.

The bachelor's degree in mathematics is offered by most colleges and universities. Mathematics courses usually required for a degree are analytical geometry, calculus, differential equations, probability and statistics, mathematical analysis, and modern algebra. Many colleges and universities urge or even require students majoring in mathematics to take several courses in a field closely related to mathematics, such as computer science, operations research, a physical science, or economics. A prospective college mathematics student should take as many mathematics courses as possible while still enrolled in high school.

More than 400 colleges and universities have programs leading to the master's degree in mathematics; about 150 also offer the Ph. D. In graduate school, students build upon the basic knowledge acquired in earlier studies. They usually concentrate on a specific field of mathematics, such as algebra, mathematical analysis, or geometry, by conducting research and taking advanced courses.

For work in applied mathematics, training in the field in which the mathematics will be used is very important. Fields in which applied mathematics is used extensively include physics, engineering, and operations research; of increasing importance are business and industrial management, economics, statistics, chemistry and life sciences, and the behavioral sciences.

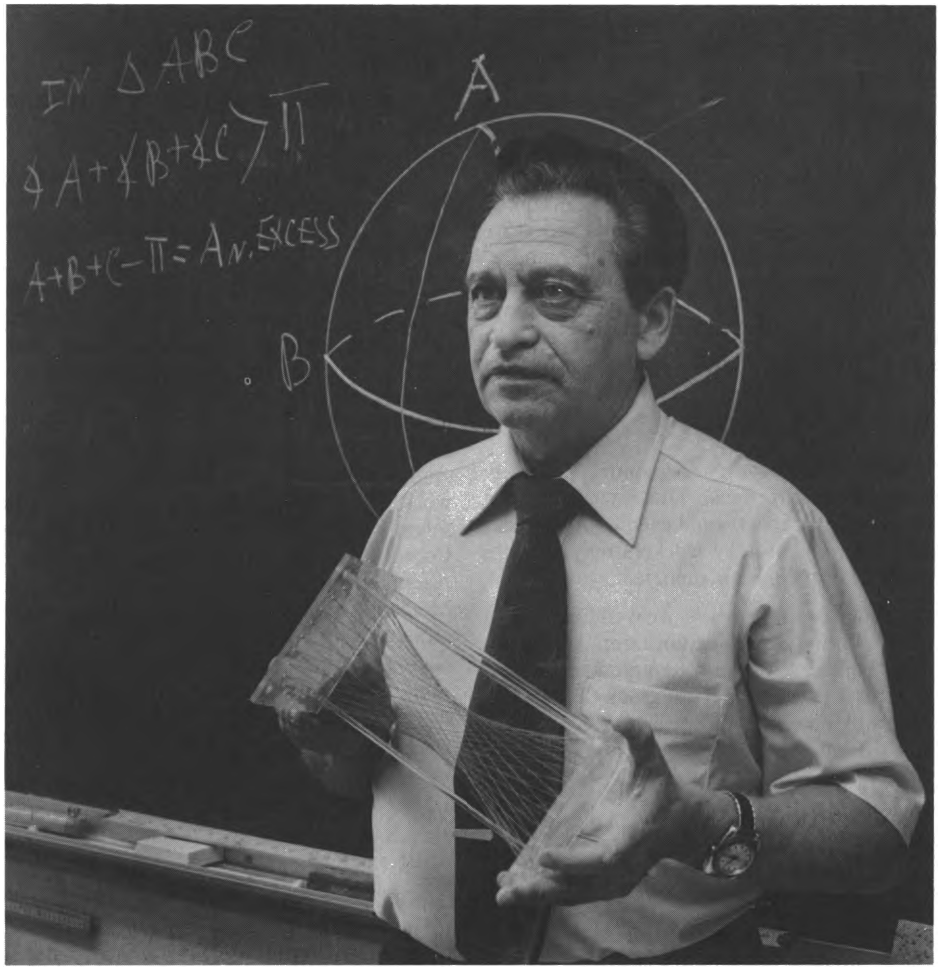
Mathematicians should have a good knowledge of computer programming since most complex mathematical computation is done by computer.

Mathematicians need good reasoning ability, persistence, and the ability to apply basic principles to new types of problems. They must be able to communicate well with others since they often must listen to a nonmathematician describe a problem in general terms, and check and recheck to make sure they understand the mathematical solution that is needed.

Employment Outlook

Employment of mathematicians is expected to increase more slowly than the average for all occupations through the 1980's because the majority of mathematicians work in colleges and universities where little employment growth is expected. Although the number of degrees granted in mathematics each year is expected to decline, the number of people seeking employment is expected to exceed job openings. As a result, persons seeking employment as mathematicians are likely to face keen competition throughout the period. Individuals with Ph. D. degrees will have better prospects than those with bachelor's or master's degrees, but some Ph. D.'s may have to seek employment in other than the traditional academic areas.

Theoretical mathematicians, who have



About three-fourths of all mathematicians work in colleges and universities.

traditionally found jobs in colleges and universities, are expected to experience the most difficulty in finding employment because colleges and universities are not expected to increase their employment of mathematicians much, if any, beyond present levels. Mathematicians hired by colleges and universities may find it increasingly difficult to acquire tenure because large proportions of many faculties already have this status but are years from retirement age. Those who do not attain tenure usually will not advance and in some schools may be forced to resign.

Holders of advanced degrees in applied mathematics should have the least difficulty in finding satisfactory employment. Although some limited opportunities may be available to theoretical mathematicians in nonacademic areas, most nonacademic employers will seek applied mathematicians who are capable of applying their special mathematical skills to practical problems. Private industry and governmental agencies will need applied mathematicians for work in operations research, numerical analysis, computer systems programming, applied mathematical physics, market research, and commercial surveys, and as consultants in industrial laboratories.

Although mathematician jobs may be difficult to obtain, college graduates with degrees in mathematics should find their background helpful for careers in other areas. Many jobs rely heavily on the application of mathematical theories and methods. Mathematics majors are likely to find openings as statisticians, actuaries, computer programmers, systems analysts, economists, engineers, and physical and life scientists. Employment opportunities in these fields will probably be best for those who combine a major in mathematics with a minor in one of these subjects.

New graduates may also find openings as high school mathematics teachers after completing professional education courses and other requirements for a State teaching certificate. (See statement on secondary school teachers elsewhere in the *Handbook*.)

Earnings

In 1978, mathematicians earned about twice the average for nonsupervisory workers in private industry, except farming. Starting salaries for mathematicians with a bachelor's degree averaged about $14,800 a year. Those with a master's degree could start at about $17,000 annually. Salaries for new graduates having the Ph. D., most of whom had some experience, averaged over $22,500.

In the Federal Government in early 1979, mathematicians having the bachelor's degree and no experience could start at either $10,507 or $13,014 a year, depending on their college records. Those with the master's degree could start at $15,920 or $19,263; and persons having the Ph. D. degree could begin at either $19,263 or $23,087. The average salary for all mathematicians in the Federal Government was about $25,900 in early 1979.

Salaries paid to college and university mathematics teachers are comparable to those for other faculty members. (See statement on college and university faculty elsewhere in the *Handbook*.)

Related Occupations

The occupations of actuary, statistician, computer programmer, systems analyst, and operations research analyst are closely related to mathematics. In addition, workers in many fields such as natural and social science, engineering, and finance use mathematics extensively.

Sources of Additional Information

Several brochures are available that give facts about the field of mathematics, including career opportunities, professional training, and colleges and universities with degree programs.

Seeking Employment in the Mathematical Sciences is available for 50 cents from:

American Mathematical Society, P.O. Box 6248, Providence, R.I. 02940.

Professional Opportunities in Mathematics is available for $1.50 from:

Mathematical Association of America, 1225 Connecticut Ave. NW., Washington, D.C. 20036.

For specific information on careers in applied mathematics, contact:

Society for Industrial and Applied Mathematics, 33 S. 17th St., Philadelphia, Pa. 19103.

Information on Federal job opportunities is available from State employment service offices or from U.S. Office of Personnel Management area offices or Federal Job Information Centers located in various large cities throughout the country.

Medical Laboratory Workers

(D.O.T. 078.121, .161, .261, .281, and .361 except -010 and -018, .381, and .687)

Nature of the Work

Laboratory tests play an important part in the detection, diagnosis, and treatment of many diseases. Medical laboratory workers, often called clinical laboratory workers, include three levels: Medical technologists, technicians, and assistants. They perform tests under the general direction

of pathologists (physicians who diagnose the causes and nature of disease) and other physicians, or scientists who specialize in clinical chemistry, microbiology, or the other biological sciences. Medical laboratory workers analyze blood, tissues, and fluids in the human body by using precision instruments such as microscopes and automatic analyzers.

Medical technologists, who usually have 4 years of postsecondary school training, perform complicated chemical, biological, microscopic, and bacteriological tests. These may include chemical tests to determine, for example, the blood cholesterol level, or microscopic examination of the blood to detect the presence of diseases such as leukemia. Technologists microscopically examine other body fluids; make cultures of body fluid or tissue samples to determine the presence of bacteria, parasites, or other microorganisms; and analyze the samples for chemical content or reaction. They also may type and cross match blood samples.

Technologists in small laboratories often perform many types of tests. Those in large laboratories usually specialize in one area such as microbiology (the study of blood cells).

Most medical technologists conduct tests related to the examination and treatment of patients. Others do research, develop laboratory techniques, teach, or perform administrative duties.

Medical laboratory technicians, who generally require 2 years of postsecondary school trining, perform a wide range of tests and laboratory procedures that require a high level of skill but not the in-depth knowledge of highly trained technologists. Like technologists, they may work in several areas or specialize in one field.

Medical laboratory assistants, who generally have a year of formal training, assist medical technologists and technicians in routine tests and related work that can be learned in a relatively short time. In large laboratories, they may specialize in one area of work. For example, they may identify abnormal blood cells on slides. In addition to performing routine tests, assistants may store and label plasma; clean and sterilize laboratory equipment, glassware, and instruments; prepare solutions following standard laboratory formulas and procedures; keep records of tests; and identify specimens.

Working Conditions

Medical laboratory personnel generally work a 40-hour week. Those working in a hospital can expect some evening and weekend duty. Laboratory workers may spend a great deal of time on their feet.

Laboratories generally are well lighted and clean. Although unpleasant odors and specimens of diseased tissue often are present, few hazards exist if proper methods of sterilization and handling of specimens, materials, and equipment are used.

Places of Employment

About 210,000 persons worked as medical laboratory workers in 1978. Most medical laboratory personnel work in hospitals. Others work in independent laboratories, physicians' offices, clinics, public health agencies, pharmaceutical firms, and research institutions. Laboratory facilities generally are concentrated in metropolitan areas.

In 1978, Veterans Administration hospitals and laboratories employed about 2,800 medical technologists and about 2,000 medical laboratory technicians. Others worked for the Armed Forces and the U.S. Public Health Service.

Training, Other Qualifications, and Advancement

The minimum educational requirement for a beginning job as a medical technologist is 4 years of college training including completion of a specialized training program in medical technology.

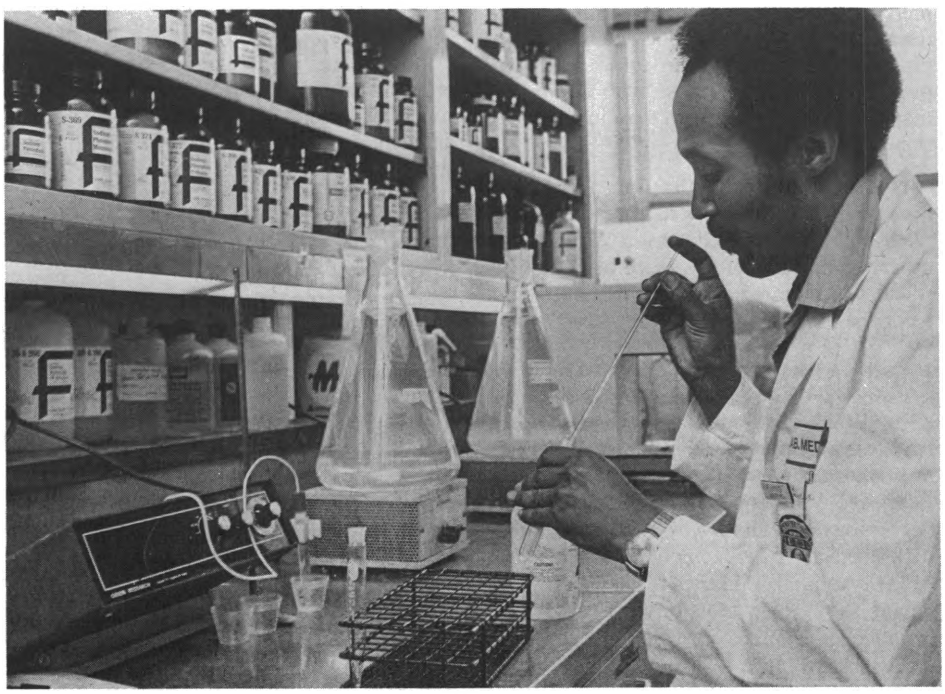
Undergraduate work includes courses in chemistry, biological sciences, and mathematics. These studies give the technologist a broad understanding of the scientific principles underlying laboratory work. Specialized training usually requires 12 months of study and includes extensive laboratory work. In 1978, about 670 hospitals and schools offered programs accredited by the Committee on Allied Health Education and Accreditation (CAHEA) of the American Medical Association. These programs were affiliated with colleges and universities; a bachelor's degree is awarded upon completion. A few programs require a bachelor's degree for entry.

Many universities also offer advanced degrees in medical technology and related subjects for technologists who plan to specialize in a certain area of laboratory work or in teaching, administration, or research.

Medical laboratory technicians acquire their training in a variety of educational settings. Many attend junior or 4-year colleges and universities for 2 years. Some are trained in the Armed Forces. Other technicians receive training in private or nonprofit vocational and technical schools. In 1978, the CAHEA accredited 72 of these programs, and the Accrediting Bureau of Health Education Schools accredited 31.

Most medical laboratory assistants are trained on the job. In recent years, however, an increasing number have studied in 1-year training programs conducted by hospitals, junior colleges in cooperation with hospitals, or vocational schools. In 1978, the CAHEA accredited 109 training programs for medical laboratory assistants. Applicants to these programs should be high school graduates or have an equivalency diploma with courses in science and mathematics. The programs include classroom instruction and practical training in the laboratory. They often begin with a general orientation to the clinical laboratory followed by courses in bacteriology, serology, parasitology, hematology, clinical chemistry, blood banking, and urinalysis.

After they pass the appropriate examinations, medical technologists may be certified as Medical Technologists, MT (ASCP), by the Board of Registry of the American Society of Clinical Pathologists; Medical Technologists, MT, by the American Medical Technologists; or Registered Medical Technologoists, RMT, by the International Society of Clinical Laboratory Technology. These organizations also cer-



Medical laboratory workers conduct a wide range of tests and analyses.

tify technicians. Certified Laboratory Technicians, CLT, are certified by the National Certification Agency for Medical Laboratory Personnel. Laboratory assistants are certified by the Board of Registry of the American Society of Clinical Pathologists.

Medical technologists must be licensed in California, Florida, Hawaii, Nevada, Tennessee, and New York City. Requirements for licensure include a written examination in some States.

Accuracy, dependability, and the ability to work under pressure are important personal characteristics for a medical laboratory worker. Manual dexterity and normal color vision are highly desirable.

Persons interested in a medical laboratory career should use considerable care in selecting a training program. They should get information about the kinds of jobs obtained by graduates, educational costs, the accreditation of the school, the length of time the training program has been in operation, instructional facilities, and faculty qualifications.

Technologists may advance to supervisory positions in certain areas of laboratory work, or, after several years' experience, to administrative medical technologist in a large hospital. Graduate education in one of the biological sciences, chemistry, management, or education usually speeds advancement. Technicians can advance to technologists by getting additional education and experience. Similarly, assistants can become technicians by acquiring more education and experience.

Employment Outlook

Employment opportunities for medical laboratory workers are expected to be favorable through the 1980's. Employment of these workers is expected to expand faster than the average for all occupations as physicians make wider use of laboratory tests in routine physical checkups and in the diagnosis and treatment of disease. Indirectly influencing growth of the field are population growth, greater health consciousness, and expansion of prepayment programs for medical care that make it easier for people to pay for services.

The use of automated laboratory test equipment is expected to lead to an increase in the number of medical laboratory technicians and assistants relative to technologists. Through technological advances, technicians and assistants can operate equipment to perform tests that previously required the skill of a technologist.

Technologists will be needed to fill supervisory positions in all laboratories. In addition to openings resulting from increased demand for these workers many jobs will become available each year because of the need to replace medical workers who die, retire, or leave the field for other reasons.

Earnings

Salaries of medical laboratory workers vary depending on the employer and geographic location. In general, medical laboratory workers employed in large cities received the highest salaries.

Starting salaries for medical technologists in hospitals averaged about $12,400 a year in 1978, according to a survey conducted by the University of Texas Medical Branch. Beginning salaries for medical laboratory technicians averaged about $10,600 a year in 1978; for certified laboratory assistants, about $9,100. According to the same survey, experienced medical technologists employed in hospitals averaged about $15,700 a year in 1978. Similarly, medical laboratory technicians with experience averaged about $13,500 a year, and certified laboratory assistants about $11,400 annually.

The Federal Government paid newly graduated medical technologists with a bachelor's degree a starting salary of about $10,500 a year in 1979. Those having experience, superior academic achievement, or a year of graduate study entered at about $13,000. The Federal Government paid medical laboratory assistants and technicians starting salaries ranging from about $6,600 to $10,500 a year in 1979, depending on the amount and type of education and experience. Medical technologists in the Federal Government averaged about $15,300 a year, and medical technicians, about $12,700 a year in 1978.

Medical laboratory workers normally receive vacation and sick leave benefits; some have retirement plans.

Related Occupations

Medical laboratory workers perform a wide variety of tests to help physicians diagnose and treat disease. Their principal activity is the analysis and identification of substances. Workers in other occupations who perform laboratory tests include biological aides, chemistry technologists, criminalists, and food testers.

Sources of Additional Information

Information about education and training for medical technologists, technicians, and laboratory assistants meeting standards recognized by the American Medical Association, the U.S. Office of Education, or both, as well as career information on these fields is available from:

American Society of Clinical Pathologists, Board of Registry, P.O. Box 11270, Chicago, Ill. 60612.

American Society for Medical Technology, 5555 W. Loop South, Bellaire, Tex. 77401.

American Medical Technologists, 710 Higgins Rd., Park Ridge, Ill. 60068.

Accrediting Bureau of Health Education Schools, Oak Manor Office, 29089 U.S. 20 West, Elkhart, Ind. 46514.

For information about other technician training programs, contact:

International Society for Clinical Laboratory Technology, 818 Olive St., St. Louis, Mo. 63101.

For a list of training programs for medical technologists, technicians, and assistants that are approved by the American Medical Association, write:

Department of Allied Health Evaluation, American Medical Association, 535 N. Dearborn St., Chicago, Ill. 60610.

For a list of training programs for medical laboratory technicians accredited by the Accrediting Bureau of Health Education Schools, write:

Secretary-ABHES, 29089 U.S. 20 West, Elkhart, Ind. 46514.

Information about employment opportunities in Veterans Administration hospitals is available from the Office of Personnel (O54E), Veterans Administration, Washington, D.C. 20420.

Information about clinical and research employment opportunities with the National Institutes of Health is available from the Clinical Center, National Institutes of Health, Bethesda, Maryland 20205.

Medical Record Administrators

(D.O.T. 079.167-014)

Nature of the Work

All health care institutions keep records that contain medical information on each patient, including case histories of illnesses or injuries, reports on physical examinations, X-rays and laboratory tests, doctors' orders and notes, and nurses' notes. These records are necessary for correct and prompt diagnosis and treatment of illnesses and injuries. They also are used for research, insurance claims, legal actions, evaluation of treatment and medications prescribed, and in the training of medical personnel. Medical information in hospitals also is used to evaluate patient care provided in the hospital and as a basis for health care planning for the community.

Medical record administrators direct the activities of the medical record department and develop systems for documenting, storing, and retrieving medical information. They supervise the medical record staff, which processes and analyzes records and reports on patients' illnesses and treatment. They train members of the medical record staff for specialized jobs, compile medical statistics required by State or national health agencies, and assist the medical staff in evaluations of patient care or research studies. Medical record administrators serving as department heads are a part of the hospital management staff and participate fully in management activities. As the administrators responsible for the medical in-

formation system, they may be required to testify in court about records and record procedures.

The size and type of institution affect the duties and amount of responsibility assigned to medical record administrators. In large hospitals, chief medical record administrators supervise other medical record administrators, technicians, and clerks. Smaller hospitals may employ only two or three persons in the medical record department; in nursing homes usually one person keeps the medical records. In these cases, a consulting medical record administrator usually advises technical and clerical personnel performing medical record functions.

Working Conditions

Medical record adminstrators generally work a standard 40-hour week in clean, well-lighted surroundings. Because the record department seldom is involved in emergency situations, the work environment may be a relaxed one. However, accuracy and attention to detail are essential, and this can be very tiring.

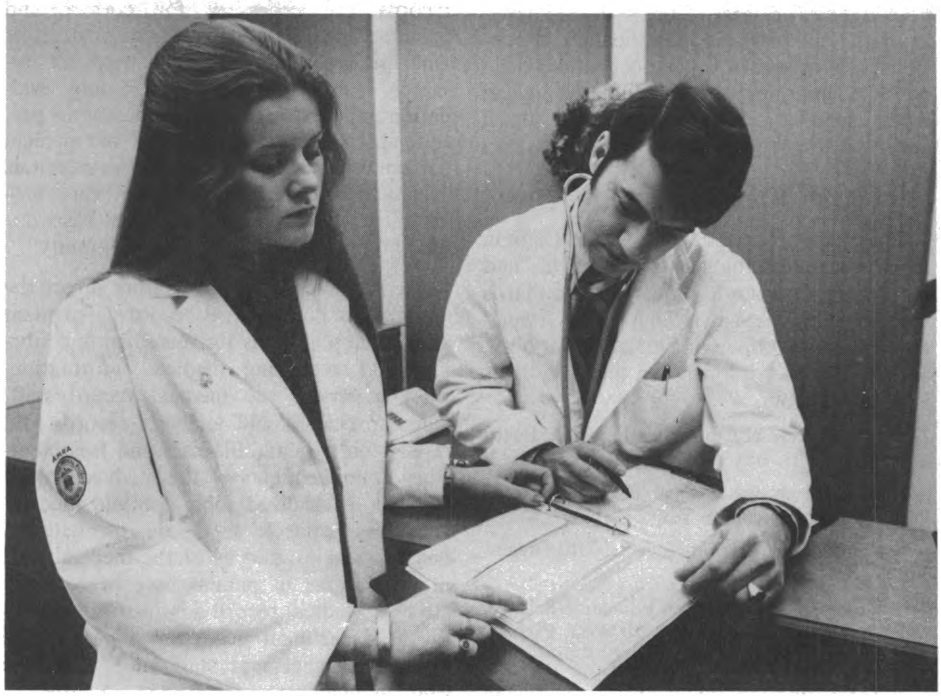
Places of Employment

Most of the 12,500 medical record administrators employed in 1978 worked in hospitals. The remainder worked in clinics, nursing homes, State and local public health departments, and medical research centers. Some health insurance companies also employ medical record administrators to help determine liability for payment of their clients' medical fees. Other medical record administrators work for firms that manufacture equipment for recording and processing medical data and develop and print health insurance and medical forms. In addition, many small health care facilities hire medical record administrators as consultants.

Training, Other Qualifications, and Advancement

Preparation for a career as a medical record administrator is offered in specialized programs in colleges and universities. Most programs last 4 years and lead to a bachelor's degree in medical record administration. However, concentration in medical record administration begins in the third or fourth year of study, making transfer from a junior college possible. One-year certificate programs also are available for those who already have a bachelor's degree and required courses in the liberal arts and biological sciences. In 1978, there were 44 programs in medical record administration approved by the Council on Medical Education and Accreditation of the American Medical Association and the American Medical Record Association (AMRA). High school courses that provide a good background include health, business administration, mathematics, and biology.

Training for medical record administrators includes both classroom instruction and practical experience. Anatomy, physiology, fundamentals of medical science, medical terminology, and medical record science are among the required scientific courses. In addition, management courses such as hospital organization and administration, health law, statistics, data processing, and computer science are part of the curriculum. Experience in the medical record departments of hospitals provides students with a practical background in applying standardized medical record practices, compiling statistical reports, analyzing data, and organizing medical record systems.



Medical record administrators often work closely with physicians.

Graduates of approved schools in medical record administration are eligible for the national registration examination given by AMRA. Passing this examination gives professional recognition as a Registered Record Administrator (RRA). According to the AMRA, there were about 6,500 employed RRA's in 1978.

Medical record administrators must be accurate and interested in detail, and must be able to speak and write clearly. Because medical records are confidential, medical record administrators must be discreet in processing and releasing information. Supervisors must be able to organize, analyze, and direct work procedures and be able to work effectively with other hospital personnel.

Medical record administrators with some experience in smaller health facilities may advance to positions as department heads in large hospitals or to higher level positions in hospital administration. Some coordinate the medical record departments of several small hospitals. Others move on to medical record positions in health agencies. Many teach in the expanding programs for medical record personnel in 2- and 4-year colleges and universities.

Employment Outlook

Employment opportunities for graduates of approved medical record administrator programs are expected to be good through the 1980's. Employment is expected to grow about as fast as the average for all occupations, with the increasing use of health facilities as more and more people are covered by health insurance. The detailed information required by third-party payers, such as insurance companies and government agencies, also will cause growth in the occupation. More consultants will be needed to standardize health records in outpatient clinics, community health centers, nursing homes, and home care programs. The importance of medical records in research and the growing use of computers to store and retrieve medical information also should increase the demand for qualified medical record administrators to develop new medical information systems. Part-time employment opportunities also should be available in teaching, research, and consulting work for health care facilities.

Earnings

The salaries of medical record administrators are influenced by the location, size, and type of the employing institution, as well as by the duties and responsibilities of the position. The average starting salary for medical record administrators in hospitals was about $14,500 a year in 1978, according to a national survey conducted by the University of Texas Medical Branch. Salaries for experienced record administrators in hosptials averaged about $18,000 a year, with some earning well over $30,000.

Newly graduated medical record administrators employed by the Federal Government generally started at about $10,500 a year in 1979; those having good academic records were eligible to begin at about $13,000. In 1978, the Federal Government paid experienced medical record administrators average salaries of about $16,000 a year.

Related Occupations

Medical record administrators work almost exclusively in hospitals and, as a member of the health care team, assume responsibility for a large volume of medical records. They train and supervise workers who verify, transcribe, code, and maintain files on patients' medical history. Workers in other occupations who provide similar administrative services in related fields include: Emergency medical service coordinators, hospital-insurance representatives, library directors, and public health educators.

Sources of Additional Information

Information about approved schools and employment opportunites is available from:

American Medical Record Association, John Hancock Center, Suite 1850, 875 N. Michigan Ave., Chicago, Ill. 60611.

Captain plotting vessel's course.

Merchant Marine Officers

Nature of the Work

Every ship has jobs of such importance to its safe operation that the persons doing them are identified as having special responsibilities. These persons are the ship's officers.

In command of every oceangoing vessel is the *captain* or *master* (D.O.T. 167-010), who is the shipowner's sole representative. The captain has complete authority and responsibility for the ship's operation and the safety of the crew, passengers, cargo, and vessel.

In port, the captain may serve as the shipowner's agent in conferring with custom officials and, in some cases, may act as paymaster for the ship. Although not technically a member of a specific department the captain usually has been promoted from the deck department and generally is associated with it.

Deck Department. Deck officers or "mates," as they are traditionally called, direct navigation of the ship and supervise the cleaning and maintenance of the deck and hull. They maintain the authorized speed and course; plot the vessel's position; post lookouts for other ships; record information in the "log" of the voyage; and immediately notify the captain of any unusual occurrences. To comply with coast guard regulations for ensuring the safe and efficient operation of ships, deck officers must be familiar with modern navigational equipment, such as sonar, radar, and radio directional finders.

The *chief mate* (D.O.T. 197.133-022), also known as the first mate or chief officer, is the captain's key assistant in assigning duties to the deck crew and maintaining order and discipline. The chief mate also plans and supervises the loading and unloading of cargo, and assists the captain in taking the ship in and out of port. On some ships, the chief mate also may be in charge of first-aid treatment.

By tradition, the *second mate* (D.O.T. 197.133-022) is the navigation officer. The second mate sees that the ship is provided with the necessary navigation charts and that navigation equipment is maintained properly.

Third mates (D.O.T. 197.133-022), the most junior-rated deck officers, act as signal officers and are in charge of all signaling equipment. They also assist in the supervision of cargo loading and unloading. The third mate frequently inspects lifesaving equipment to be sure it is ready for use in fire, shipwreck, or other emergencies.

Engine Department. Marine engineers operate all engines aboard ship. They also inspect the engines and other equipment and ensure that required repairs are made. The *chief engineer* (D.O.T. 197.130-010) supervises the engine department, and is responsible for the efficient operation of engines and other mechanical equipment. The chief engineer oversees the operation of the main powerplant and auxiliary equipment performance and fuel consumption.

The *first assistant engineer* (D.O.T. 197.-130-010) supervises engineroom personnel and directs operations such as starting, stopping, and controlling the speed of the main engines. The first assistant engineer also oversees and inspects the lubrication of engines, pumps, generators, and other machinery and, with the aid of the chief engineer, directs all types of repairs.

The *second assistant engineer* (D.O.T. 197.130-010) has charge of the boiler and associated equipment such as the water-feed system and pumps. The second assistant engineer also makes sure proper steam pressure and oil and water temperatures are maintained and supervises the cleaning of boilers.

The *third assistant engineer* (D.O.T. 197.-130-010) supervises the operation and maintenance of the lubrication system and a variety of other engineroom equipment. Some third assistant engineers are responsible for the electrical and refrigeration systems aboard ships.

Other officers. A ship keeps contact with the shore and other vessels through its *radio officer* (D.O.T. 193.282-022), who also maintains radio equipment. These officers send and receive messages by voice or Morse code and monitor the emergency frequency for distress calls. They periodically receive and record time signals, weather reports, position reports, and other information. Radio officers also may maintain depth recording equipment and electronic navigation equipment.

Some freighters and all passenger vessels carry *pursers* (D.O.T. 197.167-014). The purser or staff officer does the extensive paperwork that is required before a ship enters or leaves a port. They prepare payrolls and assist passengers as required. To improve the medical care aboard freighters and tankers and facilitate U.S. Public Health Service clearance when a ship arrives in port, some pursers have been trained as physician's assistants by the Staff Officers Association. On passenger ships these duties are performed by doctors and nurses.

Working Conditions

An officer working in the engine room must be able to withstand high temperatures while a deck officer must adapt to both bitter cold and the hot sun.

The accommodations for officers aboard U.S. vessels are generally excellent. However, some officers find being confined to a ship for long periods of time boring.

Places of Employment

About 13,500 officers were employed aboard U.S. oceangoing vessels during 1978. Deck officers and engineering officers accounted for more than four-fifths of the total, and radio officers made up most of the remainder. Due to long vacations and other breaks in service such as those resulting from illness, about two officers are employed for every job on a ship.

Nearly three-fifths of all officers were aboard freighters and most of the remainder were aboard tankers. Only a small percentage were on combination freighter-passenger vessels.

Training, Other Qualifications, and Advancement

Applicants for an officer's license in the deck or engineering departments of oceangoing vessels must meet certain legal requirements. Captains, chief and second mates, and chief and first assistant engineers must be at least 21 years old. The minimum age for third mates, third assistant engineers, and radio operators is 19. In addition, applicants must present proof of U.S. ciitzenship and obtain a U.S. Public Health Service certificate attesting to their vision, color perception, and general physical condition.

Besides legal and medical requirements, candidates must also have at least 3 years of appropriate sea experience or graduate from an approved training program. Deck officer candidates must pass Coast Guard examinations that require extensive knowledge of navigation, cargo handling, and deck department operations. Marine engineering officer candidates must demonstrate in depth knowledge of propulsion systems, electricity, plumbing and steam fitting, metal shaping and assembly, and ship structure. To advance to higher ratings, officers must pass progressively more difficult examinations.

For a Coast Guard license as a radio officer, applicants must have a first- or second-class radiotelegraph operator's license issued by the Federal Communications Commission. For a license to serve as the sole radio operator aboard a cargo vessel, the Coast Guard also requires 6 months of radio experience at sea.

Unlike most professions, no education requirements have been established for officers. A sailor with 3 years' experience in the deck or engine department may apply for either a third mate's license or for a third assistant engineer's license. However, because of the complex machinery and navigational and electronic equipment on modern ships, formal training usually is needed to pass the Coast Guard's examination for these licenses.

The fastest and surest way to become a well-trained officer is through an established training program. Such programs are available at the U.S. Merchant Marine Academy at Kings Point, N.Y., and at six State merchant marine academies: California Maritime Academy, Vallejo, Calif.; Great Lakes Maritime Academy Traverse City, Mich. Maine Maritime Academy, Castine, Maine; Massachusetts Maritime Academy, Buzzards Bay, Mass.; Texas Maritime Academy, Galveston, Tex.; and State University of New York Maritime College, Fort Schuyler, New York, N.Y. About 500 students graduate each year from these schools; about one-half are trained as deck officers and one-half as marine engineers. Admission to the U.S. Merchant Marine Academy is through nomination by a member of Congress, whereas entrance to the other academies is made through written application directly to the school.

Most of the academies offer 4-year programs in nautical science or marine engineering, which include courses such as navigation, mathematics, electronics, propulsion systems, electrical engineering, naval architecture, languages, history, and shipping management, as well as practical experience at sea. After Coast Guard examinations are passed, licenses are issued for either third mate or third assistant engineer. In addition, graduates may receive commissions as ensigns in the U.S. Naval Reserve.

Because of their thorough grounding in theory and its practical application, academy graduates are in the best position to move up to master and chief engineer ratings. Their well-rounded education also helps qualify them for shoreside jobs such as marine superintendents, operating managers, design engineers, naval architects, or shipping executives.

The U.S. Merchant Marine Academy now selects about 10 percent of the approximately 250 persons who enter the academy each year to be trained as "omnicompetent" officers. They are taught both navigational and technical skills so they can work in either the deck or engine department.

A number of trade unions in the maritime industry provide officer training. However, the number of qualified ships' officers graduating from union-sponsored schools has been reduced significantly since the end of the Vietnam War. Of the several training schools created during the 1960's, all but the National Marine Engineers' Benefical Association (MEBA)-operated Calhoon Engineering School in Baltimore, Md., have restricted training programs to upgrading officers already licensed. The Calhoon School grants a third assistant engineer's license to about 90 graduates each year. The program consists of both classroom instruction and sea experience. Two of the three years are spent at the school in Baltimore and one is spent aboard various merchant ships. Students are provided with free room, board, medical care, and text books in addition to a monthly grant. Trainees must agree to serve at least 3 years in the merchant marine after the 3-year training period.

Some unions sponsor self-study programs for unlicensed sailors to obtain either a third mate's license or a third assistant engineer's license.

Advancement for deck and engine officers is along well- defined lines and depends primarily upon specified sea experience, passing a Coast Guard examination, and leadership ability. Deck officers start as third mates. After 1 year's sea service they are eligible to take a second mate examination. A second mate may apply for a chief mate's license after 1 year of sea service. Officers in the engine department start as third assistant engineers. After 1 year of service, they may apply for a second assistant's license and finally a chief engineer's license.

Employment Outlook

Little change in the employment of ships' officers is expected through the 1980's.

From the end of World War II up through the mid-1970's, the number of vessels in our merchant marine declined steadily as owners of American ships found it economically benefical to register them outside the country. In recent years, however, the size of our fleet has stabilized and is expected to remain fairly constant through the 1980's because the Federal Government has taken steps to ensure that ships registered in the United States and operated by American crews are available to transport essential cargo. To maintain this capability, the Government sometimes pays the difference in wages if

U.S. crews are used, and helps pay for the construction of ships.

Some job openings will occur as a result of the need to replace experienced workers who retire, die, or take shoreside employment. Replacement needs are relatively high because ships' officers are somewhat older, on the average, than workers in other occupations and the liberal pension plans offered by the merchant marine industry encourage early retirement. Also, some officers find they prefer the stability of shoreside employment.

Job opportunities are expected to be favorable through the 1980's because the demand for officers is expected to exceed the number of graduates from officer training schools.

Job opportunities for merchant marine officers are expected to be excellent in related maritime fields. For example, the expanded interest in offshore mineral and oil exploration should generate a greater need for trained officers to work on oceanographic research and oil exploration vessels.

Should the Government mandate that a fixed proportion of imported oil or exported grains be carried in American ships—a move that would require American crews—employment opportunities could increase significantly.

Earnings

Earnings of officers depend upon their rank and the type of ship. Wages are highest on large ships. The accompanying tabulation shows monthly base wages for officers aboard an average freighter in 1978. Additional payments for overtime or for assuming extra responsibilities generally average about 50 percent of base pay. For example, a second mate with a monthly base pay of $1,438 may regularly earn about $2,157 each month.

Officers and their dependents enjoy substantial pension and welfare benefits. Vacations range from 16 to 30 days for each 30 days of employment. Officers with 20 years of service have the option of a monthly pension of $325 or 37 1/2 percent of their monthly rate of pay. Those who have 25 years of service are eligible for $425 a month or 50 percent of their monthly rate. Officers forced to retire prematurely due to a permanent disability receive partial pensions. Comprehensive medical care and hospitalization are provided for officers and their families through employer or union programs.

The workweek aboard ship is considerably different from the workweek on shore. At sea, most officers are required to work 7 days a week. Generally, they work two 4-hour watches (shifts) during every 24-hour period and have 8 hours off between each watch. Some officers work 8 hours a day, Monday through Friday. All officers are paid overtime for work over 40 hours a week. When the ship is in port, the basic workweek is 40 hours for all crewmembers.

Almost 90 percent of all officers belong to maritime unions. The two largest are the International Organization of Masters, Mates and Pilots, representing deck officers, and the National Marine Engineers' Beneficial Association, representing engineering officers. The Brotherhood of Marine Officers represents deck and engine officers on some ships. The Staff Officers Association and the Marine Staff Officers Association represent pursers aboard certain freighters. Radio officers are represented by the American Radio Association and the Radio Officers Union. In addition, a number of independent unions organize officers on tankers. Many officers' unions require initiation fees which range from $1,000 to $5,000.

Table 1. Monthly base wages for merchant marine officers, June 1978

Occupation	Base pay[1]
Captain	$4,159
Chief engineer	3,779
First assistant engineer	2,259
First mate	2,259
Radio officer	1,920
Second assistant engineer	1,602
Second mate	1,601
Third assistant engineer	1,438
Third mate	1,438
Purser	1,217

[1]East Coast wages aboard a single-screw ship of 12,000–17,000 power-tons.

SOURCE: U.S. Department of Commerce, Maritime Administration.

Related Occupations

Occupations having responsibilities and duties similar to merchant marine officers include fishing vessel captains, yacht masters, ship pilots, tugboat captains and mates, dredge captains and mates, ferryboat captains, passenger barge masters, riverboat masters, quartermasters, and barge captains.

Sources of Additional Information

For general information about merchant marine officers' jobs, write to:

Office of Maritime Manpower, Maritime Administration, U.S. Department of Commerce, Washington, D.C. 20230.

Information about job openings, qualifications for employment, wage scales, and other particulars is available from local maritime officers' unions. If no maritime union is listed in the local telephone directory, contact:

International Organization of Masters, Mates and Pilots, 39 Broadway, New York, N.Y. 10006.

National Marine Engineers' Beneficial Association, 444 North Capitol St., Washington, D.C. 20001.

Meteorologists

(D.O.T. 025.062-010)

Nature of the Work

Meteorology is the study of the atmosphere, which is the air that surrounds the earth. Meteorologists try to understand the atmosphere's physical characteristics, motions, and processes, and determine the way the atmosphere affects the rest of our physical environment. The best known application of this knowledge is in understanding and forecasting the weather. Meteorological research also is applied in many other areas not directly related to weather forecasting such as understanding and solving air pollution problems and studying trends in the earth's climate.

Meteorologists who specialize in forecasting the weather, known professionally as *synoptic meteorologists*, are the largest group of specialists. They study current weather information, such as air pressure, temperature, humidity, and wind velocity, in order to make short-range and long-range predictions. Their data come from weather satellites and observers in many parts of the world. Although some forecasters still prepare and analyze weather maps, most data now are plotted and analyzed by computers.

Some meteorologists are engaged in basic and applied research. For example, *physical meteorologists* study the chemical and electrical properties of the atmosphere. They do research on the effect of the atmosphere on transmission of light, sound, and radio waves, as well as study factors affecting formation of clouds, rain, snow, and other weather phenomena. Other meteorologists, known as *climatologists*, study trends in climate and analyze past records on wind, rainfall, sunshine, and temperature to determine the general pattern of weather that makes up an area's climate. These studies are used to plan heating and cooling systems, design buildings, and aid in effective land utilization.

Other meteorologists study the relationship between weather and specific human activities, biological processes, and agricultural and industrial operations. For example, they may make weather forecasts for individual companies, or work on problems such as smoke control and air pollution.

Some meteorologists teach or do research —frequently combining both activities—in colleges and universities. In colleges without separate departments of meteorology, they may teach geography, mathematics, physics, chemistry, or geology, as well as meteorology.

Working Conditions

Jobs in weather stations, which operate around the clock 7 days a week, often involve nightwork and rotating shifts. Most stations are at airports or in or near cities; some are in isolated and remote areas. Meteorologists in smaller weather stations generally work alone; in larger ones, they work as part of a team.

Places of Employment

About 7,300 persons worked as meteorologists in 1978. In addition to civilian meteorologists, thousands of members of the Armed Forces did forecasting and other meteorological work.

The largest employer of civilian meteorologists was the National Oceanic and Atmospheric Administration (NOAA), where over 1,800 worked at stations in all parts of the United States and in a small number of foreign areas. The Department of Defense employed over 200 civilian meteorologists.

Over 3,000 meteorologists worked for private industry. Commercial airlines employed several hundred to forecast weather along flight routes and to brief pilots on atmospheric conditions. Others worked for private weather consulting firms, for companies that design and manufacture meteorological instruments, and for firms in aerospace, insurance, engineering, utilities, radio and television, and other industries.

Colleges and universities employed over 1,300 meteorologists in research and teaching. A few worked for State and local governments and for nonprofit organizations.

Although meteorologists are employed in all parts of the country, almost one-seventh work in the Washington, D.C., area.

Training, Other Qualifications, and Advancement

A bachelor's degree with a major in meteorology is the usual minimum requirement for beginning jobs in weather forecasting. However, a bachelor's degree in a related science or engineering, along with some courses in meteorology, is acceptable for some jobs. For example, the Federal Government's minimum requirement for beginning jobs is a bachelor's degree with at least 20 semester hours of study in meteorology and courses in physics and mathematics, including calculus. However, employers prefer to hire those with an advanced degree, and an advanced degree is increasingly necessary for promotion.

For research and college teaching and for many top-level positions in other meteorological activities, an advanced degree, preferably in meteorology, is essential. However, people with graduate degrees in other sciences also may qualify if they have advanced courses in meteorology, physics, mathematics, and chemistry.

In 1978, 36 colleges and universities offered a bachelor's degree in meteorology or atmospheric science; 39 schools offered advanced degrees. Many other institutions offered some courses in meteorology.

The Armed Forces give and support meteorological training, both undergraduate education for enlisted personnel and advanced study for officers.

NOAA has a program under which some of its meteorologists attend college for advanced or specialized training. College students can obtain summer jobs with this agency or enroll in its cooperative education program in which they work at NOAA part of the year and attend school part of the year. In addition to helping students finance their education, this program gives them experience valuable for finding a job when they graduate.

Beginning meteorologists often start in jobs involving routine data collection, computation, or analysis. Experienced meteorologists may advance in academic rank or to various supervisory or administrative jobs. A few very well qualified meteorologists with a background in science, engineering, and business administration may establish their own weather consulting services.

Employment Outlook

Meteorologists with advanced degrees in meteorology are expected to have favorable job opportunities through the 1980's. Persons without an advanced degree are expected to face some competition for jobs.

Employment in this small field, as a whole, is expected to increase about as fast as the average for all occupations. Employment of meteorologists is expected to grow as private industry realizes their importance in understanding and preventing air pollution. Many companies also recognize the value of having their own weather forecasting and meteorological services. Openings should develop in radio and television as stations increasingly rely on their own meteorologists for weather reports. Colleges and universities will offer some job opportunities, especially for those with advanced degrees. The Federal Government is not expected to increase its employment of civilian meteorologists significantly, although there will be openings created by replacement needs.

Earnings

Meteorologists have relatively high earnings; their salaries are about twice the average for nonsupervisory workers in private industry, except farming.

In 1979, meteorologists in the Federal Government with a bachelor's degree and no experience received starting salaries of $10,507 or $13,014 a year, depending on their college grades. Those with a master's degree could start at $13,014 or $15,920, and those with the Ph. D. degree at $19,263 or $23,087. The average salary for meteorologists employed by the Federal Government was $27,600 in 1978.

In 1978, beginning meteorologists with commercial airlines earned between $17,000 and $25,000 a year, while experienced airline meteorologists earned between $25,000 and $31,000 a year. (See the statement on occupations in civil aviation elsewhere in the *Handbook*.)

Related Occupations

Workers in other occupations concerned with the environment include forest ecologists, foresters, geologists, geophysicists, oceanographers, range managers, and soil conservationists.

Commercial airlines employ meteorologists to forecast weather along flight routes.

Sources of Additional Information

General information on career opportunities in meteorology is available from:

American Meteorological Society, 45 Beacon St., Boston, Mass. 02108.

American Geophysical Union, 2000 Florida Ave. NW., Washington, D.C. 20009.

For facts about job opportunities with the NOAA National Weather Service, contact:

National Weather Service, Manpower Utilization Staff, Gramax Bldg., 8060 13th St., Silver Spring, Md. 20910.

Musicians

(D.O.T. 152.041-010)

Nature of the Work

The important role that music plays in most people's lives makes it difficult to imagine a world without musicians. Professional musicians are those whose livelihoods depend upon performing for the enjoyment of others. These professionals—whether they play in a symphony orchestra, dance band, rock group, or jazz combo—generally have behind them many years of formal or informal study and practice. As a rule, musicians specialize in either popular or classical music; only a few play both types professionally.

Musicians who specialize in popular music usually play the trumpet, trombone, clarinet, saxophone, organ, or one of the "rhythm" instruments—the piano, string bass, drums, or guitar. Dance bands play in nightclubs, restaurants, and at special parties. The best known bands, jazz groups, rock groups, and solo performers sometimes perform on television.

Classical musicians play in symphonies, opera, ballet, and theater orchestras, and for other groups that require orchestral accompaniments. These musicians play string, brass, woodwind, or percussion instruments. Some form small groups—usually a string quartet or a trio—to give concerts of chamber music. Many pianists accompany vocal or instrumental soloists, choral groups, or provide background music in restaurants or other places. Most organists play in churches; often they direct the choir.

A few exceptional musicians give their own concerts and appear as soloists with symphony orchestras. Both classical and popular musicians make individual and group recordings.

In addition to performing, many musicians teach instrumental and vocal music in schools and colleges, or give private lessons in their own studios or in pupils' homes. Others combine careers as performers with work as composers. Some work as arrangers, adapting musical compositions to different types of instruments or to styles for which they were not originally intended.

A few musicians specialize in library science for work in music libraries. Some receive training in music therapy to enable them to use music in treating persons with physical and mental disabilities. Others work as orchestra conductors or band directors, whose duties include selecting the music to be performed, auditioning and selecting members of the performing group, and directing the group at rehearsals and performances to achieve the desired musical effects.

Working Conditions

Musicians generally work at night and on weekends, and they must spend considerable time in practice and rehearsal. These long and irregular hours can be very exhausting. Performances often require travel. Many people cannot obtain year-round work as musicians, and are forced to supplement their incomes by other types of work.

Places of Employment

About 127,000 persons worked as performing musicians in 1978. Many thousands more taught in elementary and secondary schools and in colleges and universities. (See the statements on teachers elsewhere in the *Handbook*.) Almost every town and city has at least one private music teacher. Some musicians with training in music therapy work in psychiatric hospitals, centers for the mentally retarded, hospitals and schools, community mental health centers, day care centers, nursing homes, and special service agencies.

Most performing musicians work in cities where entertainment and recording activities are concentrated, such as New York City, Chicago, Los Angeles, Nashville, Miami Beach, and New Orleans. Many perform with one of the 31 major symphony groups, the 76 metropolitan orchestras, or the hundreds of community orchestras. Many communities have orchestras and dance bands which offer at least part-time work. The various branches of the Armed Forces also offer career opportunities in a number of different musical organizations.

Training and Other Qualifications

Most people who become professional musicians begin studying an instrument at an early age. To acquire great technical skill, a thorough knowledge of music, and the ability to interpret music, young people need intensive training. This training may be obtained through private study with an accomplished musician, in a college or university which has a strong music program, or in a conservatory of music. For advanced study in one of these institutions, an audition frequently is necessary. Many teachers in these schools are accomplished artists who will train only promising young musicians.

About 540 colleges, universities, and music conservatories offer bachelor's and/or higher degrees in musical performance, composition, and theory. In addition, about 750 conservatories and colleges and universities offer a bachelor's degree in music education to qualify graduates for the State certificate for elementary and secondary school teaching positions. College teaching positions usually require advanced degrees, but exceptions may be made for well-qualified artists.

The thrill of performing goes hand in hand with long and irregular hours and much traveling, which can be exhausting.

Musicians who play popular music must have an understanding of and feeling for that style of music, but classical training may expand their employment opportunities. As a rule, they take lessons with private teachers when young, and seize every opportunity to play in amateur or professional performances. Establishing a reputation with other musicians is very important in getting started in a career in popular music. Some young people form small dance bands or rock groups. As they gain experience and become known, they may audition for other local bands, and still later, for the better known bands and orchestras.

Young persons who consider careers in music should have musical talent, versatility, creative ability, and poise and stage presence to face large audiences. Since quality performance requires constant study and practice, self-discipline is vital. Moreover, musicians who do concert and nightclub engagements must have physical stamina because of frequent traveling and schedules that often include night performances.

Employment Outlook

Employment of musicians is expected to grow faster than the average through the 1980's, but competition for jobs will be keen. Opportunities for concerts and recitals are not numerous enough to provide adequate employment for all the pianists, violinists, and other instrumentalists qualified as concert artists. Competition usually is keen for positions that offer stable employment, such as jobs with major orchestras, with the Armed Forces, and in teaching positions. Because of the ease with which a musician can enter private music teaching, the number of music teachers has been more than sufficient and probably will continue to be. Although many opportunities are expected for single and short-term engagements to play popular music in nightclubs and theaters, the supply of qualified musicians who seek such jobs is likely to exceed demand. On the other hand, first-class, experienced accompanists and outstanding players of stringed instruments are likely to remain relatively scarce.

Earnings

The amount received for a performance by either classical or popular musicians depends on their geographic location as well as on their professional reputation. Minimum salaries for musicians in the 31 major symphony orchestras in the United States in 1978 ranged from $232 to $490 a week, according to the American Symphony Orchestra League. Minimum salaries for musicians in the 28 regional symphony orchestras ranged from $90 to $270 a week. Minimum wages for musicians in metropolitan symphony orchestras were generally between $20 and $40 per concert. Some musicians earned substantially more than the minimums, however.

The major symphony orchestras have seasons ranging from 45 to 52 weeks. None of the metropolitan or community orchestras have seasons of 50 to 52 weeks, however.

Musicians in large metropolitan areas who had steady engagement contracts to play at dances, clubs, variety shows, ballets, musical comedies, concerts, and industrial shows generally earned minimums ranging from $6.50 to $10.50 per hour, depending on the length and type of engagement. Wages for the same types of engagements tended to be less in smaller cities and towns. Musicians employed in motion picture recording earned a minimum of about $108 for a 3-hour session; those employed in television commercials earned a minimum of $54 each for 2 to 5 musicians and $50 each for more than 5 musicians for a 1-hour session. Musicians employed by recording companies were paid a minimum of about $127 for a 3-hour session.

Music teachers in public schools earn salaries comparable to those of other teachers. (See statements on elementary and secondary school teachers elsewhere in the *Handbook*.) Many teachers give private music lessons to supplement their earnings. However, earnings often are uncertain and vary according to the musician's reputation, the number of teachers and students in the locality, and the economic status of the community.

Many musicians, primarily those employed by symphony orchestras, work under master wage agreements, which guarantee a season's work up to 52 weeks. Musicians in other areas, however, may face relatively long periods of unemployment between jobs. Thus, their earnings generally are lower than those in many other occupations. Moreover, since they may not work steadily for one employer, some performers cannot qualify for unemployment compensation, and few have either sick leave or vacations with pay. For these reasons, many musicians take other types of jobs to supplement their earnings as musicians.

Most professional musicians belong to the American Federation of Musicians (AFL-CIO). Concert soloists also belong to the American Guild of Musical Artists, Inc. (AFL-CIO).

Related Occupations

Performing musicians express ideas and emotions through the music they play. Other occupations in the music field include arrangers, composers, copyists, music critics, music directors, music librarians, music teachers, music therapists, orchestra conductors, orchestrators, instrument repairers, music or instrument sales people, and radio music producers.

Sources of Additional Information

For information about wages, hours of work, and working conditions for professional musicians, contact:

American Federation of Musicians (AFL-CIO), 1500 Broadway, New York, N.Y. 10036.

The requirements for certification of organists and choir masters are available from:

American Guild of Organists, 630 Fifth Ave., New York, N.Y. 10020.

For information about a career in music therapy, contact:

National Association for Music Therapy, Inc., P.O. Box 610, Lawrence, Kans. 66044.

For programs in music teacher education, contact:

Music Educators National Conference, 1902 Association Dr., Reston, Va. 22091.

Information about certification of private music teachers is available from:

Music Teachers National Association, 2113 Carew Tower, Cincinnati, Ohio 45202.

A list of accredited schools of music is also available for $3.25 from:

National Association of Schools of Music, 11250 Roger Bacon Dr., Reston, Va. 22090.

A brochure entitled *Careers in Music* is available from any of the last three organizations listed above.

Newspaper Reporters

(D.O.T. 131.067-010, 018, and 022; 131.267-014 and 018)

Nature of the Work

A free press is one of the most important institutions in a democratic society. Newspapers inform us about local, State, national, and international events; present differing points of view on current issues; and monitor the actions of public officials and others who exercise power. Newspaper reporters, therefore, play a vital role in American society. They gather information on current events and use it to write stories for daily or weekly newspapers. In covering events, they may interview people, review public records, and do research. As a rule, reporters take notes or use tape recorders while out of the office collecting facts and write their stories upon returning to the office. Sometimes, to meet deadlines, they telephone their information or stories to rewriters who write or transcribe the stories for them.

Large dailies frequently assign teams of reporters to investigate social, economic, or political conditions and some reporters to "beats," such as police stations or the courts, to gather news originating in these places. General assignment reporters write up local news, such as a story about a school board meeting or an obituary of a community leader. Specialized reporters with a background or interest in a particular subject interpret and analyze the news in fields such as medicine, politics, foreign affairs, sports, fashion, art, theater, consumer affairs, travel, finance, social events, science, education, business, labor, and religion. Critics review

literary, artistic, and musical works and performances while editorial writers present viewpoints on topics of public interest.

Reporters on small newspapers cover all aspects of local news, and also may take photographs, write headlines, lay out pages, and write editorials. On some small weeklies, they also may solicit advertisements, sell subscriptions, and perform general office work.

Working Conditions

The work of newspaper reporters is usually hectic. Reporters are under pressure to meet deadlines and work under the most trying conditions—the continuous disturbance of noisy typewriters and loud conversation and the confusion of people constantly on the go. Some assignments covering wars, political uprisings, fires, floods, and other events may be dangerous.

Reporters working for morning papers often work from late afternoon until midnight. Employees of afternoon or evening papers generally work from early in the morning until early or midafternoon. However, reporters must be prepared to gather news whenever it occurs. Their work may demand long hours, irregular schedules, and some travel. Foreign correspondents often work late at night to send news to papers in time for printing.

Places of Employment

About 45,000 persons worked as newspaper reporters in 1978. Many worked for urban daily newspapers; others worked for suburban, community, or smalltown weekly papers and national press services.

Reporters work in cities and towns of all sizes, but the great majority of the approximately 1,760 daily and 7,670 weekly newspapers in existence in 1978 were in medium-sized towns. However, most reporters work in big cities, since big city dailies employ many reporters, whereas a smalltown paper generally employs only a few.

Training, Other Qualifications, and Advancement

Most newspapers consider only applicants who have a college education. Graduate work is increasingly important. Most editors prefer graduates who have a degree in journalism, which includes training in the liberal arts along with professional training in journalism. Some editors consider a liberal arts degree sufficient. Others prefer applicants who have a bachelor's degree in liberal arts and a master's degree in journalism. High school courses that are important include English, journalism, social studies, and typing.

In 1978, the majority of journalism graduates who landed jobs on daily newspapers prepared specifically for news work while they were in college by majoring in news-editorial journalism. News-editorial majors generally found news jobs more easily than journalism graduates majoring in other specialties—advertising, public relations, or broadcasting.

Bachelor's degree programs in journalism are available in about 240 colleges. About three-fourths of the courses in a typical undergraduate journalism curriculum are in liberal arts. Required journalism courses include introductory mass media, basic reporting and copy editing, history of journalism, and press law and ethics. Other journalism courses are elected in the student's specific area of interest.

About 350 community and junior colleges offer journalism courses or programs. Credit earned may be transferable to 4-year college programs in journalism. Some junior colleges also offer programs especially designed to prepare the student directly for employment as a general assignment reporter on a small weekly or daily newspaper. However, such graduates find it increasingly difficult to compete with graduates of 4-year programs. The Armed Forces also provide some training in journalism.

A master's degree in journalism was offered by about 70 schools in 1978; about 20 schools offered the Ph. D. degree. Some graduate programs are intended primarily as preparation for news careers, while others concentrate on preparing journalism teachers, researchers and theorists, and advertising and public relations workers.

Liberal arts courses useful to persons preparing for newspaper work include English courses with an emphasis on writing, sociology, political science, economics, history, psychology, computer science, business, and speech. The ability to read and speak a foreign language is desirable. Those who aspire to reporting in a specialized field—science or finance, for example—should concentrate on course work in their subject area.

Skill in typing is essential because reporters type their own news stories. Also, familiarity with a typewriter keyboard is important because a growing number of reporters work in newsrooms where computerized word-processing equipment is used for writing and editing stories. The ability to take shorthand also is useful. On small papers, knowledge of news photography is valuable.

The Newspaper Fund and individual newspapers offer summer internships that provide college students with an opportunity to practice the rudiments of reporting or editing. Experience acquired through such internships helps immeasurably in job placement after graduation. In addition, more than 3,000 journalism scholarships, fellowships, and assistantships were awarded to college journalism students by universities, newspapers, foundations, and professional organizations in 1978.

News reporting involves a great deal of responsibility, since what a reporter writes frequently influences the opinion of the reading public. Reporters should be dedicated to serving the public's need for accurate and impartial news. Although reporters work as part of a team, they have an opportunity for self-expression. The ability to express facts and opinions clearly and succinctly is, of course, essential for success in this field. Accuracy and objectivity are equally important, because untrue or libelous statements could involve newspapers in costly lawsuits.

Important personal characteristics include a "nose for news," curiosity, persistence, initiative, poise, resourcefulness, an accurate memory, and the physical stamina and emotional stability to deal with pressing deadlines, irregular hours, and sometimes danger-

Newspaper reporters lead hectic lives when meeting deadlines.

ous assignments. Because some assignments lead reporters to unfamiliar places, they must be able to adapt to strange surroundings and feel at ease around different kinds of people.

Some who compete for full-time reporter jobs find it is helpful to have had experience as a newspaper "stringer"—a part-time reporter who covers the news in a particular area of the community and is paid on the basis of the stories printed. High school and college newspapers, and church or community newsletters, also provide writing and editing experience that may be helpful in getting a job.

Most beginners start on weekly or on small daily newspapers as general assignment reporters or copy editors. A few outstanding journalism graduates are hired by large city papers, but this is the exception rather than the rule. Large dailies generally require several years of reporting experience, which usually is acquired on smaller newspapers.

Beginning reporters are assigned duties such as reporting on civic and club meetings, summarizing speeches, writing obituaries, interviewing important visitors to the community, and covering police court proceedings. As they gain experience, they may report more important events, cover an assigned "beat," or specialize in a particular field.

Newspaper reporters may advance to reporting for larger papers or press services. However, competition for such positions is fierce and news executives are flooded with applications from highly qualified reporters every year. Some experienced reporters become columnists, correspondents, editorial writers, editors, or top executives; these positions represent the top of the field and competition for them is extremely keen. Other reporters transfer to related fields such as public relations, writing for magazines, or preparing copy for radio and television news programs.

Employment Outlook

Employment of newspaper reporters is expected to grow about as fast as the average for all occupations through the 1980's. This growth will come about because of an increase in the number of smalltown and suburban daily and weekly newspapers, for the most part; little or no increase is anticipated in the number of big city dailies, although some of them may increase the size of their reporting staffs. In addition to the openings that result from employment growth, openings will arise from the need to replace newspaper reporters who die, retire, transfer to other fields of work, or leave the profession for other reasons.

Overall, journalism graduates who have taken the news-editorial sequence and completed a newspaper internship while in school should have the best prospects for newspaper reporting jobs. Most editors prefer to hire the top graduates of accredited programs. Talented writers who are able to handle news about highly specialized scientific or technical subjects will be at an advantage on the job market. Small papers often look for beginning reporters who are acquainted with the community and who can help with photography and other aspects of newspaper production. Persons without at least a bachelor's degree in journalism will face increasingly stiff competition for entry level positions.

Weekly or daily newspapers located in small towns and suburban areas are expected to continue to offer the best opportunities for beginning reporters. Journalism graduates who are willing to relocate and start at relatively low salaries are likely to find reporting jobs on these newspapers. Openings arise on small papers as reporters gain experience and move up to editorial positions, or transfer to reporting jobs on larger newspapers.

Competition for reporting jobs on large metropolitan newspapers will be keen. Most big city dailies require experience and do not ordinarily hire new graduates. Sometimes, however, new graduates find newsroom jobs on major dailies because they have credentials in an area for which the paper has a pressing need. Occasionally, the experience and contacts gained through an internship program or summer job lead to a reporting job directly after graduation.

Because enrollments in journalism education programs are expected to rise through the 1980's, college teaching opportunities are expected to be good for qualified applicants —generally, Ph. D.'s with practical reporting experience. Some highly qualified reporters with a master's degree will find teaching positions in journalism departments of colleges and junior colleges. This favorable outlook for journalism educators contrasts with the generally bleak prospect for college faculty in many other academic disciplines.

In addition to newspaper reporting, college graduates who have majored in journalism have the background for work in such closely related fields as advertising, public relations, trade and technical publishing, magazine publishing, and radio and television broadcasting. Every year, a substantial number of journalism graduates take media jobs in fields such as these. For example, journalism graduates with strong backgrounds in science or mathematics are well suited for jobs on scientific and industrial publications. Other graduates accept sales, managerial, and other nonmedia positions, while still others continue their training in fields such as law, business, public administration, and politics.

Earnings

Reporters working for daily newspapers having contracts negotiated by the Newspaper Guild had starting salaries ranging from about $135 to about $460 a week in early 1979. The majority earned between $200 and $275 a week.

Reporters having 4 or 5 years of experience who worked for daily newspapers with Guild contracts averaged about $370 a week in early 1979. Virtually all experienced reporters earned over $250 a week while the top contractual salary was $560 a week. A number of top reporters on big city dailies earned even more, on the basis of merit. The minimum salaries of experienced reporters working for the two national wire services were around $410 and $430 a week. In general, earnings of newspaper reporters are above average earnings of nonsupervisory workers in private industry, except farming.

Most newspaper reporters generally work a 5-day, 35- or 40-hour week and receive extra pay for overtime work. Benefits may vary widely according to length of service and the size and location of the newspapers. Most reporters, however, receive benefits such as paid vacations, group insurance, and pension plans.

Related Occupations

Newspaper reporters must write clearly and effectively to succeed in their profession. Others for whom writing ability is essential include technical writers, translators, advertising copy writers, public relations workers, educational writers, humorists, fiction writers, biographers, screen writers, and editors.

Sources of Additional Information

Career information, including a pamphlet entitled, "Your Future in Daily Newspapers," is available from:

American Newspaper Publishers Association Foundation, The Newspaper Center, Box 17407, Dulles International Airport, Washington, D.C. 20041.

A pamphlet entitled, "Facts About Newspapers," is available from:

American Newspaper Publishers Association, The Newspaper Center, Box 17407, Dulles International Airport, Washington, D.C. 20041.

Information on careers in journalism, colleges and universities that offer degree programs in journalism or communications, and journalism scholarships and internships may be obtained from:

The Newspaper Fund, Inc., P.O. Box 300, Princeton, N.J. 08540.

For a list of junior and community colleges offering programs in journalism, contact:

National Community College Journalism Association, San Antonio College, 1300 San Pedro Avenue, San Antonio, Texas 78284.

Information on union wage rates is available from:

The Newspaper Guild, Research and Information Department, 1125 15th St. NW., Washington, D.C. 20005.

For a list of schools with accredited sequences in their journalism departments, send a stamped, self-addressed envelope to:

American Council on Education for Journalism, School of Journalism, University of Missouri, Columbia, Mo. 65205.

For general information about careers in journalism, contact:

Association For Education in Journalism, 102 Reavis Hall, Northern Illinois University, Dekalb, Ill. 60115.

The Society of Professional Journalists, Sigma Delta Chi, 35 East Wacker Dr., Chicago, Ill. 60601.

Information on opportunities for women in newspaper reporting and other communications fields is available from:

Women In Communications, Inc., P.O. Box 9561, Austin, Tex. 78766.

Names and locations of newspapers and a list of schools and departments of journalism are published in the *Editor and Publisher International Year Book*, available in most public libraries and newspaper offices.

Occupational Therapists

(D.O.T. 076.121-010)

Nature of the Work

Occupational therapists plan and direct educational, vocational, and recreational activities designed to help mentally, physically, or emotionally disabled patients become self-sufficient. They evaluate the capacities and skills of patients, set goals, and plan a therapy program together with the client and members of a medical team that may include physicians, physical therapists, vocational counselors, nurses, social workers, and other specialists.

About 2 therapists out of 5 work with mentally or emotionally handicapped patients, and the rest work with physically disabled persons. These clients represent all age groups and degrees of disability. Patients participate in occupational therapy to determine the extent of abilities and limitations; to regain physical, mental, or emotional stability; to relearn daily routines such as eating, dressing, writing, and using a telephone; and, eventually, to prepare for employment.

Occupational therapists teach manual and creative skills, such as weaving and leatherworking, and business and industrial skills, such as typing and the use of power tools. These skills are taught to restore the patient's mobility, coordination,and confidence. Therapists also plan and direct games and other activities, especially for children. They may design and make special equipment or devices to help disabled patients.

Besides working with patients, occupational therapists supervise student therapists, occupational therapy assistants, volunteers, and auxiliary nursing workers. The chief occupational therapist in a hospital may teach medical and nursing students the principles of occupational therapy. Many therapists supervise occupational therapy departments, coordinate patient activities, or are consultants to local and State health departments and mental health agencies. Some teach in colleges and universities.

Occupational therapist helps patient regain his hand-eye coordination.

Working Conditions

Although occupational therapists generally work a standard 40 hour week, they may occasionally have to work evenings or weekends. Their work environment varies according to the setting and available facilities. In a large rehabilitation center, for example, the therapist may work in a spacious room equipped with machines, handtools, and other devices that can generate noise. In a nursing home, the therapist might work in a kitchen, using food preparation as therapy. In a hospital, the only tools may be building blocks or paints used on small tables placed around the room. Wherever they work and whatever tools they use,they generally have adequate lighting and ventilation. The job can be physically tiring because therapists are on their feet much of the time.

Places of Employment

About 15,000 occupational therapists were employed in 1978. About 3 out of 10 occupational therapists work in hospitals. Rehabilitation centers, nursing homes, schools, outpatient clinics, community mental health centers, and research centers employ most of the others. Some work in special sanitariums or camps for handicapped children, others in State health departments. Still others work in home-care programs for patients unable to attend clinics or workshops. Some are members of the Armed Forces. Many occupational therapists work part time.

Training, Other Qualifications, and Advancement

A degree and certification in occupational therapy is required to enter the profession. In 1978, 53 colleges and universities offered programs in occupational therapy that were accredited by the Council on Allied Health and Education Accreditation of the American Medical Association and the American Occupational Therapy Association. All of these schools offer a bachelor's degree program. Some have a 2-year program and accept students who have completed 2 years of college. Some also offer shorter programs, leading to a certificate or a master's degree in occupational therapy for students who have a bachelor's degree in another field. A graduate degree often is required for teaching, research, or administrative work.

Course work in occupational therapy programs includes physical, biological, and behavioral sciences and the application of occupational therapy theory and skills. These programs also require students to work for 6 to 9 months in hospitals or health agencies to gain experience in clinical practice. Graduates of accredited educational programs are eligible to take the American Occupational Therapy Association certification examination to become a registered occupational therapist (OTR). Occupational therapy assistants who are certified by the association (COTA's) and have 4 years of approved work experience also are eligible to take the examination to become registered occupational therapists. Those COTA's considering this path of entry to the occupation should contact the Director of Certification of the American Occupational Therapy Association to identify the types of experience required to qualify for the examination and to determine the availability of suitable work settings.

Entry to educational programs is keenly competitive and applicants are screened carefully to select those most likely to complete their studies successfully. Persons considering this profession, therefore, should have above average academic performance and consistent grades of "B" or better in science

courses, including biology and chemistry. In addition to biology and chemistry, high school students interested in careers as occupational therapists are advised to take courses in health, crafts, and the social sciences. College students who consider transferring from another academic discipline to an occupational therapy program in their sophomore or junior year need superior grades because competition for entrance to programs is more intense after the freshman year.

Personal qualifications needed in the profession include a sympathetic but objective approach to illness and disability, maturity, patience, imagination, manual skills, and the ability to teach.

Newly graduated occupational therapists generally begin as staff therapists. Advancement is chiefly to supervisory or administrative positions; some therapists pursue advanced education and teach or conduct medical research.

Employment Outlook

Employment opportunities for occupational therapists are expected to be favorable through the 1980's. The increasing number of graduates is expected to be roughly in balance with openings expected from future need for these workers and replacement of workers who die, retire, or leave the field for other reasons.

Employment in this occupation is expected to grow much faster than the average for all occupations due to public interest in the rehabilitation of disabled persons and the success of established occupational therapy programs. Many therapists will be needed to staff hospital rehabilitation departments, community health centers, extended care facilities, psychiatric centers, schools for children with developmental and learning disabilities, and community home health programs.

Earnings

Beginning salaries for new graduates of occupational therapy programs working in hospitals averaged about $13,000 a year in 1978, according to a national survey conducted by the University of Texas Medical Branch. Some experienced therapists earned as much as $22,000, and some administrators as much as $25,000 to $30,000.

In 1979, beginning therapists employed by the Veterans Administration (VA) earned starting salaries of about $11,700 a year. The average salary paid occupational therapists working for the VA was about $17,100 in 1978.

Related Occupations

Occcupational therapists use specialized knowledge to help patients prepare to return to work and generally aid them to adjust to their disability. Other workers performing similar duties include orthotists, physical therapists, prosthetists, and speech pathologists and audiologists.

Sources of Additional Information

For more information on occupational therapy as a career, write to:

American Occupational Therapy Association, 6000 Executive Blvd., Rockville, Md. 20852.

Those COTA's interested in qualifying for the examination to become a registered occupational therapist (OTR) through acquired work experience should contact the Director of Certification at the above address.

Occupational Safety and Health Workers

(D.O.T. 010.061-026; 012.061-014, .167-022, -026, -034, and -058, and .261-010; .079.021-010 and .161-010; 168.167-078, .264-014, and .267-074; 373.167-018 and .367-010; and 821.367-014)

Nature of the Work

People in the occupational safety and health field have the challenging job of insuring a safe and healthful environment for workers and safe products for consumers. Safety and health workers in a number of different occupations strive to control occupational accidents and diseases, property losses, and injuries from unsafe products. Workers employed in safety and health occupations peculiar to government are discussed in the statement on health and regulatory inspectors elsewhere in the *Handbook*.

The largest group of safety workers is *safety engineers*. Although all of them are concerned with preventing accidents, their specific tasks depend on where they work. For example, the safety engineer working in a large manufacturing plant (D.O.T. 012.-061-014) may develop a comprehensive safety program covering several thousand employees. This usually entails detailed analysis of each job in the plant to identify potential hazards so that preventive measures can be taken. When accidents do occur, safety engineers in manufacturing plants investigate to determine the cause. If poor design, improper maintenance, or mechanical failure is involved, they use their technical skills to correct the situation and prevent its recurrence. When human error is the cause of an accident, safety engineers may establish training courses for plant workers and supervisors or reemphasize existing ones.

Safety engineers who work for trucking companies (D.O.T. 909.127-010) study schedules, routes, loads, and speeds to determine their influence on trucking accidents. They also inspect heavy rigs, such as trucks and trailers, to suggest ways of safer operation. In the mining industry, safety engineers (D.O.T. 010.061-026) may inspect underground or open-pit areas to insure compliance with State and Federal laws, design protective equipment and safety devices for mine machinery, or lead rescue activities during emergencies.

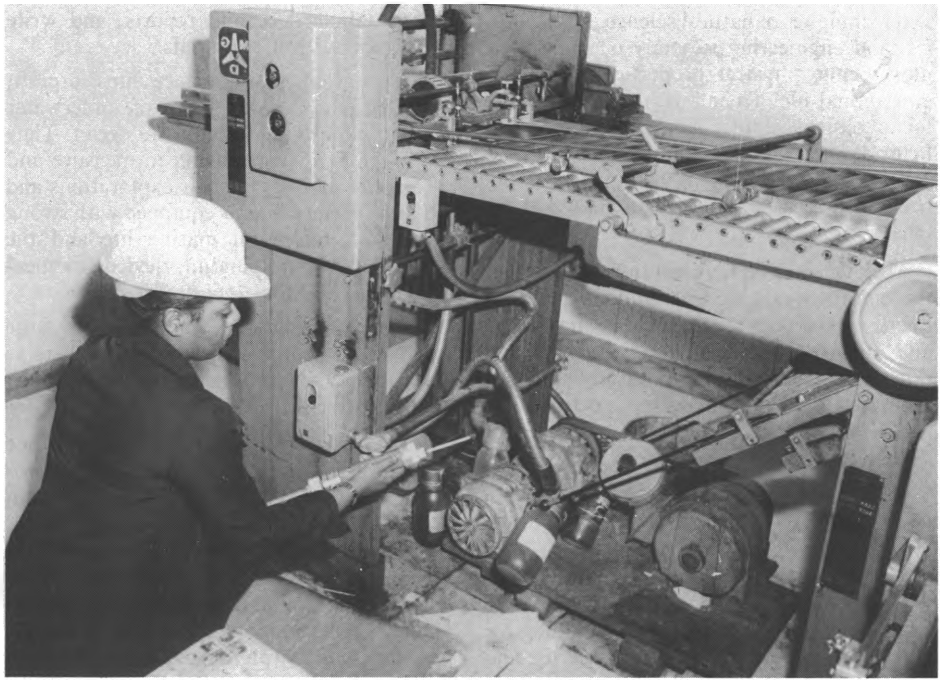
Many safety engineers are directly concerned with the safety of their company's product. They work closely with design engineers to develop models that meet all safety standards, and they monitor the manufacturing process to insure the safety of the finished product.

Safeguarding life and property against loss from fire, explosion, and related hazards is the job of the *fire protection engineer* (D.O.T. 012.167-026). Those who specialize in research investigate problems such as fires in high-rise buildings or the manufacture, handling, and storage of flammable materials. Fire protection engineers in the field use these research findings to identify hazards and devise ways to correct them. For example, new findings concerning flashpoints (the temperatures at which different materials will ignite) are valuable to the engineer designing storage facilities in a chemical plant.

Like safety engineers, fire protection engineers may have different job duties depending on where they work. One who works for a fire equipment manufacturing company may design new fire protection devices, while engineers in consulting firms work with architects and others to insure that fire safety is built into new structures. In contrast, fire protection engineers working for insurance rating bureaus (organizations that calculate basic costs of insurance coverage in particular areas) inspect private, commercial, and industrial properties to evaluate the adequacy of fire protection for the entire area. Many fire protection engineers have special expertise in one area or more of fire protection, such as sprinkler or fire detection systems.

Losses in the workplace cannot be reduced without measures to eliminate hazards to workers' health. Designing and maintaining a healthful work environment are the responsibilities of *industrial hygienists* (D.O.T. 079.161-010). These health professionals are concerned with how noise, dust, vapors, and other hazards common to the industrial setting affect workers' health. After a problem is detected, perhaps by analyzing employee medical records, the industrial hygienist at the job site may take air samples, monitor noise levels, or measure radioactivity levels in the areas under investigation.

Other industrial hygienists work in private laboratories or in those maintained by large insurance companies or industrial firms. Laboratory hygienists analyze air samples, do research on the reliability of health equipment such as respirators, or investigate the effects of exposure to chemicals or radiation. Some hygienists specialize in problems of air and water pollution. For example, these health professionals may work with government officials, environmental groups, labor organizations, and plant management to develop a system to screen harmful substances before they enter and pollute a river.



Safety engineers inspect plant machinery for potential hazards.

Loss control and *occupational health consultants* (D.O.T. 168.167-078) in property-liability insurance companies perform many services for their clients. These range from correcting a single hazard in a small business to devising a program to eliminate or reduce all losses arising out of a large firm's operation. When dealing with a new account, the consultant makes a thorough inspection of the plant and then confers with management to formulate a program that meets the company's needs. The consultant may, for example, help set up plant health programs and medical services, assist plant personnel to insure that a new facility meets all safety requirements, or train plant safety people. Safety and health consultants also help their company's underwriters determine whether a risk is acceptable and the amount of premium to charge.

Working Conditions

Although occupational safety and health workers are based in offices, much of their time is spent at work sites inspecting or studying safety hazards, talking to workers, or taking air or dust samples. Safety and health workers may have to travel a great deal if they don't work exclusively at a single plant. The amount of travel required depends upon job specialty and geographic location. For example, the plant safety engineer may travel only to seminars and conferences, while the insurance consultant may spend about half the time traveling between worksites. Usually, a car is furnished or workers are reimbursed for the expenses of using their own vehicles.

Places of Employment

An estimated 80,000 persons were engaged in occupational safety and health work in 1978. About half of them were safety engineers, and most of the rest were fire protection engineers, industrial hygienists, or workers who divided their time between two or more of these areas. A relatively small number of occupational safety and health workers were employed as technicians.

The largest numbers of occupational safety and health workers were employed by manufacturing firms, although they were employed by firms in most other industries as well. Property and liability insurance companies employ many safety and health workers to provide engineering, consulting, and inspection services to their clients. Others worked for a variety of industrial, manufacturing, and commercial concerns.

Occupational safety and health workers are generally employed in population and industrial centers. Insurance consultants generally have their headquarters in a region's major city and travel to and from the sites they visit.

Training, Other Qualifications, and Advancement

Entry level safety and health professionals generally need at least a bachelor's degree in engineering or science. A more specialized degree, such as one in safety management, industrial safety, mechanical or chemical engineering, or fire protection engineering, often is helpful in getting a good job. Many employers prefer applicants with a graduate degree in areas such as industrial hygiene, public health, safety engineering, or occupational safety and health engineering, or those with prior industrial work experience. Some employers will hire graduates of 2-year college curriculums as technicians, particularly if they have work experience related to the job.

Continuing education is necessary to stay abreast of changing technologies, new ideas, and emerging trends. Many insurance companies offer training seminars and correspondence courses for their staffs. The Occupational Safety and Health Administration (OSHA) conducts courses for safety and health workers on topics such as occupational injury investigation and radiological health hazards. The recognized marks of achievement in the field are the designations Certified Safety Professional; Certified Industrial Hygienist; and Member, Society of Fire Protection Engineers. Certification is conferred by the Board of Certified Safety Professionals and the American Board of Industrial Hygiene, after the candidate completes the required experience and passes an examination. A small number of States require that occupational safety and health professionals be licensed.

In addition to possessing technical competence, safety and health workers must be able to communicate well and motivate others. They should be able to adapt quickly to different situations, being equally at ease with a representative of a local union, a supervisor in the welding shop, or a corporate executive. Because physical activity is basic to the job, good physical condition is necessary.

In the insurance industry, safety and health workers can be promoted to department manager in a small branch office, move up to larger branch offices, and finally take an executive position in the home office. In industrial firms, they can advance to plant safety and health manager or corporate manager over several plants. Although extensive experience is required, technicians can advance to professional safety and health positions.

Employment Outlook

Employment of safety and health workers is expected to increase faster than the average for all occupations through the 1980's as concern grows for occupational safety and health and consumer safety. Many openings will arise also to replace workers who die, retire, or leave their jobs for other reasons.

Much of the employment growth is expected to occur in industrial and manufacturing firms. Many firms now without a safety and health program are expected to establish one, and others will upgrade and expand existing programs in response to government requirements, union interest, and rising insurance costs. The number of safety and health workers in casualty insurance companies also will increase as more small employers request the services of their insurer's engineering or loss control department. Prospects should be best for graduates of occupational safety or health curriculums and persons with graduate degrees in related areas.

Earnings

Occupational safety and health workers had median salaries of $27,000 a year in 1978, more than twice the average earnings

for nonsupervisory workers in private industry, except farming. Safety and health workers were paid average starting salaries of $14,500 a year in 1978. Those with a graduate degree usually received higher starting salaries, and technicians somewhat lower ones. Many safety and health workers with supervisory responsibilities earned more than $30,000 a year.

Related Occupations

Occupational safety and health workers are responsible for seeing that industrial production is carried out in a manner that is safe for workers. Related occupations also concerned with the technology of production include mechanical, chemical, product safety, industrial, and pollution-control engineers.

Sources of Additional Information

For general information about safety careers, write to:

American Society of Safety Engineers, 850 Busse Hwy., Park Ridge, Ill. 60068.

Information is also available from the Society on colleges and universities offering degree programs in the occupational safety and health field.

Information concerning a career in industrial hygiene is available from:

American Industrial Hygiene Association, 475 Wolf Ledges Pkwy., Ohio 44311.

Career information concerning fire protection engineering may be obtained from:

Society of Fire Protection Engineers, 60 Batterymarch St., Boston, Mass. 02110.

Career information on insurance loss control consulting is available from the home offices of many property-liability insurance companies.

The National Institute for Occupational Safety and Health of the U.S. Public Health Service provides general information on requirements for various careers in the occupational safety and health field, as well as lists of college and universities that award degrees in the various occupational safety and health disciplines. This information is available from:

Division of Training and Manpower Development, National Institute for Occupational Safety and Health, Robert A. Taft Laboratories, 4676 Columbia Pkwy., Cincinnati, Ohio 45226.

Oceanographers

(D.O.T. 024.061-018, -030, and 041.061-022)

Nature of the Work

Oceans cover more than two-thirds of the earth's surface and are a valuable source of food, fossil fuels, and minerals. They also influence the weather, serve as a "highway" for transportation, and offer many kinds of recreation. Oceanographers use the principles and techniques of natural science, mathematics, and engineering to study oceans—their movements, physical properties, and plant and animal life. Their research not only extends basic scientific knowledge, but also helps develop practical methods for forecasting weather, developing fisheries, mining ocean resources, and improving national defense.

Most oceanographers test their ideas about the ocean by making observations and conducting experiments at sea. They may study and collect data on ocean tides, currents, and other phenomena. They may study undersea mountain ranges and valleys, oceanic interactions with the atmosphere, and layers of sediment on and beneath the ocean floor.

Many oceanographers work primarily in laboratories on land where, for example, they measure, dissect, and photograph fish. They also study sea specimens and plankton (floating microscopic plants and animals). Much of their work entails identifying, cataloging, and analyzing different kinds of sea life and minerals. At other laboratories, oceanographers plot maps or use computers to test theories about the ocean. For example, they may study and test the theory of continental drift, which states that the continents were once joined together, have drifted to new positions, and continue to drift, causing the sea floor to spread in places. To present the results of their studies, oceanographers prepare charts, tabulations, and reports, and write papers for scientific journals.

Oceanographers use surface ships, aircraft, satellites, and various types of underwater craft to explore and study the ocean. They use specialized instruments to measure and record the findings of their explorations and studies; special cameras equipped with strong lights to photograph marine life and the ocean floor; and sounding devices to measure, map, and locate ocean materials.

Research facilities equipped with large water tanks enable some oceanographers to simulate and study oceanic phenomena such as waves and tides.

Most oceanographers specialize in one branch of the science. *Biological oceanographers* (marine biologists) study plant and animal life in the ocean. The biological oceanographer's research has practical applications in improving and controlling commercial and sport fishing and in determining the effects of pollution on marine life. *Physical oceanographers* (physicists and geophysicists) study the physical properties of the ocean such as waves, tides, and currents. Their research on the relationships between the sea and the atmosphere may lead to more accurate prediction of the weather. *Geological oceanographers* (marine geologists) study the ocean's underwater mountain ranges, rocks, and sediments; some use the knowledge obtained to find valuable minerals, oil,

Oceanographers use specialized instruments in their studies.

and gas beneath the ocean floor. *Chemical oceanographers* investigate the chemical composition of ocean water and sediments as well as chemical reactions in the sea. *Oceanographic engineers* design and build instruments for oceanographic research and operations. They also lay cables and supervise underwater construction.

Many other scientists also work on problems related to oceans, but are counted in other scientific fields such as biology, chemistry, or geology. Scientists who specialize in the study of fresh water aquatic life are called *limnologists.*

Working Conditions

When conducting research in land-based laboratories, oceanographers work in clean and comfortable surroundings. Research on ocean expeditions requires oceanographers to be away from home for weeks or months at a time. Working and living areas on small research ships are sometimes cramped. Some oceanographers use scuba gear, submersible craft, and other equipment to work under water.

Places of Employment

About 3,600 persons worked as oceanographers in 1978. Over one-half worked in colleges and universities, and about one-fifth for the Federal Government. Federal agencies employing substantial numbers of oceanographers include the Navy and the National Oceanic and Atmospheric Administration (NOAA). Some oceanographers work in private industry; a few work for fishery laboratories of State and local governments.

Although some oceanographers are employed in almost every State, most work in States that border on the ocean. Nearly one-fifth of all oceanographers work in the Washington, D.C., metropolitan area.

Training, Other Qualifications, and Advancement

The minimum requirement for beginning professional jobs in oceanography is a bachelor's degree with a major in oceanography, biology, earth or physical sciences, mathematics, or engineering. However, most other jobs in research and teaching require graduate training in oceanography or a basic science. For many high-level positions a doctoral degree is preferred, and sometimes required.

About 65 colleges and universities offered undergraduate degrees in oceanography or marine sciences in 1978. However, undergraduate training in a basic science and a strong interest in oceanography may be adequate preparation for some beginning jobs and is the preferred background for graduate training in oceanography.

College courses needed to prepare for graduate study in oceanography include mathematics, physics, chemistry, geophysics, geology, meteorology, and biology. In general, students should specialize in the particular science that is closest to their area of oceanographic interest. For example, students interested in chemical oceanography should obtain a degree in chemistry.

In 1978, about 55 colleges offered advanced degrees in oceanography and marine sciences. In graduate schools, students take advanced courses in oceanography and in basic sciences.

Graduate students usually do research part-time aboard-ship to become familiar with the sea and with techniques used to obtain oceanographic information. Universities having oceanographic research facilities offer summer courses for both graduate and undergraduate students.

Beginning oceanographers with the bachelor's degree usually start as research or laboratory assistants, or in jobs involving routine data collection, computation, or analysis. Depending on their background and needs, most beginning oceanographers receive on-the-job training.

Experienced oceanographers often direct surveys and research programs or advance to administrative or supervisory jobs in research laboratories.

Employment Outlook

Persons seeking jobs in oceanography may face competition through the 1980's. Those with a Ph. D. degree should have the best opportunities; those with less education may find limited opportunities as research assistants or technicians; and those who combine a scientific background with oceanography should have better prospects than others whose knowledge is limited to oceanography.

Employment of oceanographers is expected to grow about as fast as the average for all occupations as awareness increases of the need for ocean research to understand and control pollution and to recover offshore oil and other resources. However, this small field may not grow fast enough to create openings for all those expected to seek entry. Since the Federal Government finances most oceanographic research, a large increase in Federal spending in oceanography could improve employment prospects.

Earnings

The salaries of oceanographers were more than twice the average received by nonsupervisory workers in private industry, except farming.

In 1979, oceanographers in the Federal Government with a bachelor's degree received starting salaries of $10,507 or $13,014 a year, depending on their college grades. Those with a master's degree could start at $15,920 or $19,263; and those with a Ph. D. degree at $19,263 or $23,087. The average salary for experienced oceanographers in the Federal Government in 1978 was about $25,900 a year.

Oceanographers in educational institutions generally receive the same salaries as other faculty members. (See statement on college and university faculty elsewhere in the *Handbook*.) In addition to regular salaries, many earn extra income from consulting, lecturing, and writing.

Related Occupations

Other occupations in which workers apply mathematical and scientific laws and principles to specific problems and situations include astronomers, chemists, geographers, geologists, geophysicists, mathematicians, meteorologists, and physicists.

Sources of Additional Information

For information about careers in oceanography, contact:

Dr. C. Schelske, Secretary, American Society of Limnology and Oceanography, I.S.T. Bldg., Great Lakes Research Division, University of Michigan, Ann Arbor, Mich. 48109.

Federal Government career information is available from any local office of the Federal Job Information Center or from:

U.S. Office of Personnel Management, Washington Area Office, 1900 E St. NW., Washington, D.C. 20415.

The booklet, *Training and Careers in Marine Science*, is available for 50 cents from:

International Oceanographic Foundation, 3979 Rickenbacker Causeway, Miami, Fla. 33149.

Some information on oceanographic specialties is available from professional societies listed elsewhere in the *Handbook*. (See statements on geologists, geophysicists, life scientists, meteorologists, and chemists.)

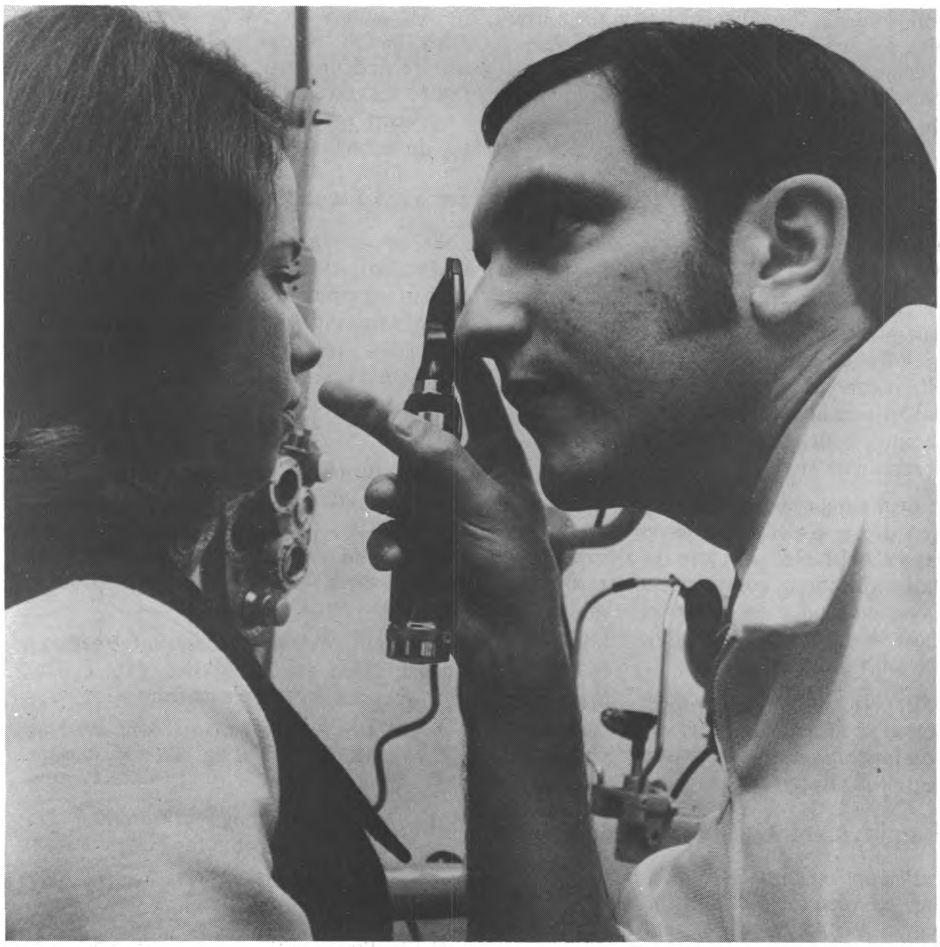
Optometrists

(D.O.T. 079.101-018)

Nature of the Work

About 1 out of every 2 persons in the United States wears corrective lenses. Optometrists provide most of this care. They examine people's eyes for vision problems, disease, and other abnormal conditions and test for proper depth and color perception and the ability to focus and coordinate the eyes. When necessary, they prescribe lenses and treatment. Where evidence of disease is present, the optometrist refers the patient to the appropriate medical practitioner. Most optometrists supply the prescribed eyeglasses and fit and adjust contact lenses. Optometrists also prescribe vision therapy or other treatment not requiring surgery.

Although most optometrists are in general practice, some specialize in work with the aged or with children. Others work only with persons having partial sight who can be helped with microscopic or telescopic lenses. Still others are concerned with the visual safety of industrial workers. Some optometrists teach or do research.



About 1 out of every 2 persons in the United States wears corrective lenses.

Optometrists should not be confused with either ophthalmologists, sometimes referred to as oculists, or dispensing opticians. Ophthalmologists are physicians who specialize in medical eye care, eye diseases, and injuries; perform eye surgery; and prescribe drugs or other eye treatment, as well as lenses. Dispensing opticians fit and adjust eyeglasses according to prescriptions written by ophthalmologists or optometrists; they do not examine eyes or prescribe treatment. (See statements on physicians and dispensing opticians.)

Working Conditions

Optometrists work in places—usually their own offices—that are clean, well lighted, and comfortable. The work requires a lot of attention to detail. Because the work is not physically strenuous, optometrists often can continue to practice after the normal retirement age.

Places of Employment

In 1978, there were about 21,000 practicing optometrists. The majority of optometrists are in solo practice. Others are in partnership or group practice with other optometrists or doctors as part of a professional health care team.

Some optometrists work in specialized hospitals and eye clinics or teach in schools of optometry. Others work for the Veterans Administration, public and private health agencies, and industrial health insurance companies. About 500 optometrists serve as commissioned officers in the Armed Forces. Optometrists also act as consultants to engineers specializing in safety or lighting, consultants to educators in remedial reading, or participants on health advisory committees to Federal, State, and local governments.

About 2 optometrists out of 5 practice in towns of under 25,000 inhabitants.

Training, Other Qualifications, and Advancement

All States and the District of Columbia require that optometrists be licensed. Applicants for a license must have a Doctor of Optometry degree from an accredited optometric school or college and pass a State board examination. In some States, applicants are permitted to substitute the examination of the National Board of Examiners in Optometry, given in the second, third and fourth years of optometric school, for part or all of the written State examination. Some States allow applicants to be licensed without lengthy examination if they have a license in another State. In 44 States, optometrists are required to continue their education in optometry to retain their licenses.

The Doctor of Optometry degree requires a minimum of 6 or 7 years of college consisting of a 4-year professional degree program preceded by at least 2 or 3 years of preoptometric study at an accredited university, college, or junior college. In 1979, there were 13 U.S. schools and colleges of optometry accredited by the Council on Optometric Education of the American Optometric Association. Requirements for admission to these schools usually include courses in English, mathematics, physics, chemistry, and biology or zoology. Some schools also require courses in psychology, social studies, literature, philosophy, and foreign languages. Admission to optometry schools is competitive. Each year, qualified applicants exceed available places, so serious applicants need superior grades in their preoptometric college courses to enhance their chances for acceptance.

Because most optometrists are self-employed, business ability, self-discipline, and the ability to deal with patients tactfully are necessary for success.

Many beginning optometrists enter into associate practice with an optometrist or other health professional. Others purchase an established practice or set up a new practice. Some take salaried positions to obtain experience and the necessary funds to enter their own practice.

Optometrists wishing to advance in a specialized field may study for a master's or Ph. D. degree in physiological optics, neurophysiology, public health administration, health information and communication, or health education. Optometrists who enter the Armed Forces as career officers have the opportunity to work toward advanced degrees and to do vision research.

Employment Outlook

Employment opportunities for optometrists are expected to be favorable through the 1980's. The number of new graduates from schools of optometry is expected to be adequate to fill the positions made available by employment growth and the need to replace optometrists who die or retire.

Employment of optometrists is expected to grow faster than the average for all occupations. An increase in the total population, especially in the group most likely to need glasses—older people—is a major factor contributing to the expected growth in the occupation. Greater recognition of the importance of good vision and the likelihood that more persons will have health insurance to cover optometric services also should increase the demand for optometric services.

Earnings

In 1978, net earnings of new optometry graduates in their first full year of practice averaged about $16,900. Experienced optometrists averaged about $40,000 annually. Optometrists working for the Federal Government earned an average of $22,700 a year in 1978. Incomes vary greatly, depending upon location, specialization, and other fac-

tors. Optometrists who start out by working in commercial settings tend to earn more money initially than optometrists who set up their own solo practice. However, in the long run, those with their own private practice have the potential to earn more than those employed in commercial settings.

Independent practitioners can set their own work schedule. Some work over 40 hours a week, including Saturday.

Related Occupations

Other occupations in which the main activity consists of applying logical thinking and scientific knowledge to diagnose and treat disease, disorders, or injuries in humans or animals are chiropractors, dentists, physicians, osteopathic physicians, podiatrists, and veterinarians.

Sources of Additional Information

Information on optometry as a career and a list of scholarships and loan funds offered by various State associations, societies, and institutions are available from:

American Optometric Association, 243 North Lindbergh Blvd., St. Louis, Mo. 63141.

Career guidance information for persons considering becoming optometrists can be obtained by writing to:

Association of Schools and Colleges of Optometry, Suite 210, 1730 M St. NW., Washington, D.C. 20036.

Federal Health Professions Loans are available for optometric students who meet certain criteria of financial need. For information on this financial aid, on the availability of Federal scholarships, and on required preoptometry courses, contact individual optometry schools. The Board of Optometry in the capital of each State can supply a list of optometry schools approved by that State, as well as licensing requirements.

Osteopathic Physicians

(D.O.T. 071.101-010)

Nature of the Work

Osteopathic physicians (D.O.s) diagnose and treat diseases or maladies of the human body. They place special emphasis on the musculo-skeletal system of the body —bones, muscles, ligaments, and nerves. One of the basic treatments or therapies used by osteopathic physicians centers on manipulating this system with the hands. Osteopathic physicians also use surgery, drugs, and all other accepted methods of medical care.

Most osteopathic physicians are "family doctors" who engage in general practice. These physicians usually see patients in their offices, make house calls, and treat patients in osteopathic and other private and public hospitals. Some doctors of osteopathy teach, do research, or write and edit scientific books and journals.

In recent years, specialization has increased. In 1978, about 25 percent of all osteopathic physicians were practicing in specialties, including internal medicine, neurology and psychiatry, ophthalmology, pediatrics, anesthesiology, physical medicine and rehabilitation, dermatology, obstetrics and gynecology, pathology, proctology, radiology, and surgery.

Working Conditions

Many osteopathic physicians work more than 50 or 60 hours a week. Those in general practice usually work longer and more irregular hours than specialists. As osteopathic physicians grow older, they may accept fewer new patients and tend to work shorter hours. However, many continue to practice well beyond 70 years of age.

Places of Employment

About 17,000 osteopathic physicians practiced in the United States in 1978. Almost 85 percent of the active osteopathic physicians were in private practice. A small number were full time staff or faculty members of osteopathic hospitals and colleges, private industry, or government agencies.

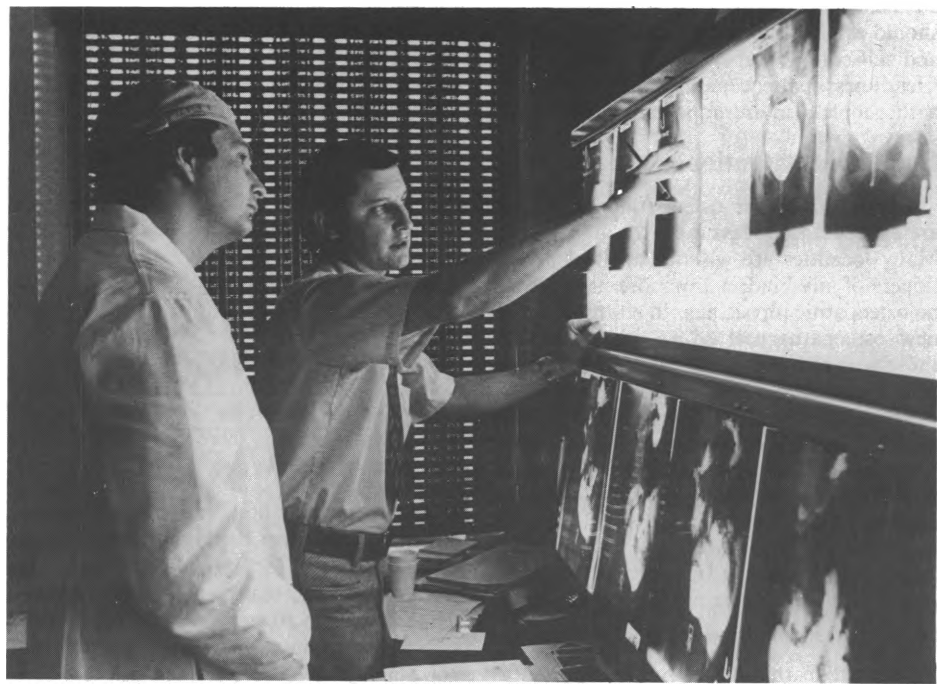
Osteopathic physicians are located chiefly in those States that have osteopathic hospital facilities. In 1978, three-fifths of all osteopathic physicians were in Florida, Michigan, Pennsylvania, New Jersey, Ohio, Texas, and Missouri. Twenty-one States and the District of Columbia each had fewer than 50 osteopathic physicians. More than half of all general practitioners are located in towns and cities having fewer than 50,000 people; specialists, however, practice mainly in large cities.

Training and Other Qualifications

All 50 States and the District of Columbia require a license to practice osteopathic medicine. To obtain a license, a candidate must be a graduate of an approved school of osteopathic medicine and pass a State board examination. In four States, candidates must pass an examination in the basic sciences before they are eligible to take the professional examination; 38 States and the District of Columbia also require a period of internship in an approved hospital after graduation from an osteopathic school. The National Board of Osteopathic Examiners also gives an examination which is accepted by most States as a substitute for State examination. Most States grant licenses without further examination to osteopathic physicians already licensed by another State.

The minimum educational requirement for entry to one of the schools of osteopathic medicine is 3 years of college work, but in practice almost all osteopathic students have a bachelor's degree. Preosteopathic education must include courses in chemistry, physics, biology, and English. Osteopathic colleges require successful completion of 3 to 4 years of professional study for the degree of Doctor of Osteopathy (D.O.). During the first half of professional training, emphasis is placed on basic sciences, such as anatomy, physiology, and pathology, and on the principles of osteopathy; the remainder of the time is devoted largely to experience with patients in hospitals and clinics.

After graduation, nearly all doctors of osteopathic medicine serve a 12-month internship at 1 of the 90 osteopathic hospitals ap-



Osteopathic physicians are particularly concerned about problems involving the muscles and bones.

proved by the American Osteopathic Association for intern or residency training. Those who wish to specialize must have 2 to 5 years of additional training.

The osteopathic physician's lengthy training is very costly. Federal and private loans are available to help students meet these costs. In addition, scholarships are available to qualified applicants who agree to a minimum of 2 years' Federal service after graduation.

In 1979, there were 14 schools of osteopathic medicine. Schools admit students on the basis of their college grades, scores on the required New Medical College Admissions Test, and recommendations from premedical college counselors. The applicant's desire to serve as an osteopathic physician rather than as a doctor trained in other fields of medicine is a very important qualification. Colleges also give considerable weight to a favorable recommendation by an osteopathic physician familiar with the applicant's background.

Newly qualified doctors of osteopathic medicine usually establish their own practice, although a growing number enter group practice. Some work as assistants to experienced physicians or join the staff of osteopathic or allopathic (M.D.) hospitals. In view of the variation in State laws, persons who wish to become osteopathic physicians carefully should study the professional and legal requirements of the State in which they plan to practice. The availability of osteopathic hospitals and clinical facilities also should be considered.

Persons who wish to become osteopathic physicians must have a strong desire to pursue this career above all others. They must be willing to study a great deal throughout their career in order to keep up with the latest advances in osteopathic medicine. They should exhibit leadership, emotional stabiliy, and self-confidence. A pleasant personality, friendliness, patience, and the ability to deal with people also are important.

Employment Outlook

Opportunities for osteopathic physicians are expected to be favorable through 1980's. Many localities are without medical practitioners of any kind; many more have few or no osteopathic physicians. In addition, many new osteopaths will be needed to replace those who retire or die. The greatest demand probably will continue to be in States where osteopathic medicine is a widely known and accepted method of treatment, such as Pennsylvania, Florida, and several Midwestern States. Generally, prospects for beginning a successful practice are likely to be best in rural areas, small towns, and city suburbs, where young doctors of osteopathy may establish their professional reputations more easily than in the large cities.

The osteopathic profession is expected to grow faster than the average for all occupations through the 1980's because of general population growth and the rising proportion of elderly persons, the establishment of additional osteopathic hospital facilities, and the extension of prepayment programs for hospitalization and medical care including Medicare and Medicaid.

Earnings

In osteopathic medicine, as in many of the other health professions, incomes usually rise markedly after the first few years of practice. Earnings of individual practitioners are determined mainly by ability, experience, geographic location, and the income level of the community served. Graduates who had completed an approved 3-year residency but had no other experience received a starting salary at a Veterans Administration hospital of about $32,500 a year in 1979. In addition, those who worked full time received up to $7,000 in other cash benefits or "special" payments. In general, the income earned by D.O.s compares favorably with other professions. Specialists usually earn higher incomes than general practitioners.

Related Occupations

Osteopathic physicians work to prevent, diagnose, and treat diseases, disorders, and injuries. Other occupations that require the exercise of similar critical judgments include: Audiologist, chiropractor, dentist, optometrist, physician, podiatrist, speech pathologist, and veterinarian.

Sources of Additional Information

People who wish to practice in a given State should find out about the requirements for licensure directly from the board of examiners of that State. Information on Federal scholarships and loans is available from the director of student financial aid at the individual schools of osteopathy. For a list of State boards, as well as general information on osteopathy as a career, contact:

American Osteopathic Association, Department of Public Relations, 212 East Ohio St., Chicago, Ill. 60611.

American Association of Colleges of Osteopathic Medicine, 4720 Montgomery Lane, Washington, D.C. 20014.

Personnel and Labor Relations Workers

(D.O.T. 166 and 169.207-010)

Nature of the Work

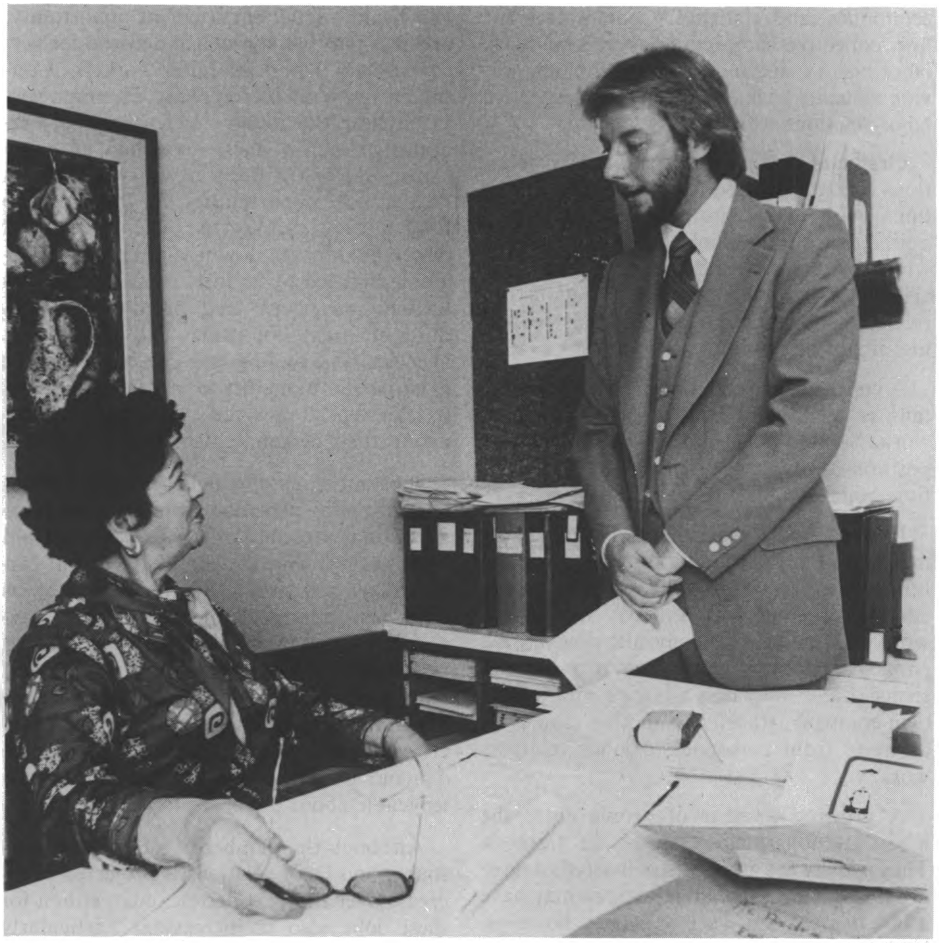
Attracting the best employees available and matching them to the jobs they can do best is important for the success of any organization. Today, many enterprises have become too large to permit close contact between management and employees. Instead, personnel and labor relations workers provide this link—assisting management to make effective use of employees' skills, and helping employees to find satisfaction in their jobs and working conditions. Although some jobs in this field require only limited contact with people outside the office, most involve frequent contact with others. Dealing with people is an essential part of the job.

Personnel workers and labor relations workers concentrate on different aspects of employer-employee relations. Personnel workers interview, select, and recommend applicants to fill job openings. They handle wage and salary administration, training and career development, and employee benefits. "Labor relations" usually means union-management relations, and people who specialize in this field work mostly in unionized businesses and government agencies. They help officials prepare for collective bargaining sessions, participate in contract negotiations with the union, and handle labor relations matters that come up every day.

In a small company, personnel work consists mostly of interviewing and hiring, and one person usually can handle it all. By contrast, a large organization needs an entire staff, which might include recruiters, interviewers, counselors, job analysts, wage and salary analysts, education and training specialists, and labor relations specialists, as well as technical and clerical workers.

Personnel work often begins with the *personnel recruiter* or *employment interviewer* (D.O.T. 166.267-010), who travels around the country, often to college campuses, in the search for promising job applicants. These workers talk to applicants, and select and recommend those who appear qualified to fill vacancies. They often administer tests to applicants and interpret the results. Hiring and placement specialists need to be thoroughly familiar with the organization and its personnel policies, for they must be prepared to discuss wages, working conditions, and promotional opportunities with prospective and newly hired employees. They also need to keep informed about equal employment opportunity (EEO) and affirmative action guidelines. Special EEO counselors or coordinators handle this complex and sensitive area in some large organizations. The work of employment counselors, which is similar in a number of ways, is described in a separate chapter of the *Handbook*.

Job analysts (D.O.T. 166.067-010) and *salary and wage administrators* (D.O.T. 166.-167-022) do very exacting work. Job analysts collect and examine detailed information on jobs, including job qualifications and worker characteristics, in order to prepare job descriptions. These descriptions, sometimes called position classifications, explain the duties, training, and skills each job requires. Whenever a government agency or large business firm introduces a new job or evaluates existing ones, it calls upon the expert knowledge of the job analyst. Accurate information about job duties also is required when a firm evaluates its pay system and considers changes in wages and salaries. Establishing and maintaining pay systems is the principal



Personnel workers interview and select applicants to fill job openings.

job of wage administrators. They devise ways to ensure that pay rates within the firm are fair and equitable, and conduct surveys to see how their pay rates compare with others. Being certain that the firm's pay system complies with laws and regulations is another part of the job, one that requires knowledge of compensation structures and labor law.

Training specialists supervise or conduct training sessions, prepare manuals and other materials for these courses, and look into new methods of training. They also counsel employees on training opportunities, which may include on-the-job, apprentice, supervisory, or management training.

Employee-benefits supervisors and other personnel specialists handle the employer's benefits program, which often includes health insurance, life insurance, disability insurance, and pension plans. These workers also coordinate a wide range of employee services, including cafeterias and snack bars, health rooms, recreational facilities, newsletters and communications, and counseling for work-related personal problems. Counseling employees who are approaching retirement age is a particularly important part of the job.

Occupational safety and health programs are handled in various ways. In small companies especially, accident prevention and industrial safety are the responsibility of the personnel department—or of the labor relations specialist, if the union has a safety representative. Increasingly, however, there is a separate safety department under the direction of a safety and health professional, generally a safety engineer or industrial hygienist. (The work of occupational safety and health workers is discussed in another chapter of the *Handbook*.)

Labor relations specialists (D.O.T. 166.-167-034) advise management on all aspects of union-management relations. When a company's contract is up for negotiation, they provide background information and technical support, a job that requires extensive knowledge of economics, labor law, and collective bargaining trends. Actual negotiation of the agreement is conducted at the top level, with the director of labor relations or another top-ranking official serving as the employer's representative, but members of the company's labor relations staff play an important role throughout the negotiations.

Much of the everyday work of the labor relations staff concerns interpretation and administration of the contract, the grievance procedures in particular. Members of the labor relations staff might work with the union on seniority rights under the layoff procedure set forth in the contract, for example. Later in the day, they might meet with the union steward about a worker's grievance. Doing the job well means staying abreast of current developments in labor law, including arbitration decisions, and maintaining continuing liaison with union officials.

Personnel workers in government agencies generally do the same kind of work as those in large business firms. There are some differences, however. Public personnel workers deal with employees whose jobs are governed by civil service regulations. Civil service jobs are strictly classified as to duties, training, and pay. This requires a great deal of emphasis on job analysis and wage and salary classification; many people in public personnel work spend their time classifying and evaluating jobs, or devising, administering, and scoring competitive examinations given to job applicants.

Knowledge of rules and regulations pertaining to affirmative action and equal opportunity programs is important in public personnel work. In 1972, the U.S. Civil Service Commission—now the Office of Personnel Management—established a specialization for Federal personnel workers concerned with promoting equal opportunity in hiring, training, and advancement. Similar emphasis is evident in State and local government agencies.

Labor relations is an increasingly important specialty in public personnel administration. Labor relations in this field have changed considerably in recent years, as union strength among government workers has grown. This has created a need for more and better trained workers to handle negotiations, grievances, and arbitration cases on behalf of Federal, State, and local government agencies.

Working Conditions

Since personnel offices generally are located where outside visitors and prospective employees gain an initial impression of the organization, they tend to be modern and pleasant places to work. Personnel employees usually work a standard 35 to 40 hour workweek. Labor relations workers, however, may work longer hours—particularly when contract agreements are being prepared and negotiated.

Although most of their time is spent in the office, personnel workers may be required to do some traveling. They may attend professional conferences, for example, or visit a university to recruit prospective employees.

Places of Employment

In 1978, about 405,000 people were personnel and labor relations workers. Nearly 3 out of 4 worked in private industry, for manufacturers, banks, insurance companies, airlines, department stores, and other business concerns. Some worked for private employment agencies, including executive job-search agencies, "office temporaries" agencies, and others.

A large number of personnel and labor relations workers, over 100,000 in 1978, worked for Federal, State, and local govern-

ment agencies. Most of these were in personnel administration; they handled recruitment, interviewing, testing, job classification, training, and other personnel matters for the Nation's 15 million public employees. Some were on the staff of the U.S. Employment Service and State employment agencies. Still others worked for agencies that oversee compliance with labor laws. Some, for example, were wage-hour compliance officers; their work is described in another part of the *Handbook*, in the section on health and regulatory inspectors (Government). Other public employees in this field carried out research in economics, labor law, personnel practices, and related subjects, and sought new ways of ensuring that workers' rights under the law are understood and protected.

Compared with private industry, labor unions employ few professionally trained labor relations workers. An elected union official generally handles labor relations matters at the company level. At national and international union headquarters, however, the research and education staff usually includes specialists with a degree in industrial and labor relations, economics, or law.

A few personnel and labor relations workers are in business for themselves as management consultants or labor-management relations experts. In addition, some teach college or university courses in personnel administration, industrial relations, and related subjects.

Most jobs for personnel and labor relations workers are located in the highly industrialized sections of the country.

Training, Other Qualifications, and Advancement

Most beginning positions in personnel and labor relations are filled by with college graduates. Some employers look for graduates who have majored in personnel administration or industrial and labor relations, while others prefer college graduates with a general business background. Still other employers feel that a well-rounded liberal arts education is the best preparation. A college major in personnel administration, political science, or public administration can be an asset in looking for a job with a government agency.

Approximately 200 colleges and universities offer undergraduate courses in personnel or labor relations. In addition, 30 schools offer a master's degree in labor or industrial relations. (While personnel administration is widely taught, the number of programs that focus primarily on labor relations is quite small.) In addition, many schools offer course work in closely related fields. An interdisciplinary background is appropriate for work in this area, and a combination of courses in the social sciences, behavioral sciences, business, and economics is useful.

Prospective personnel workers might include courses in personnel management, business administration, public administration, psychology, sociology, political science, economics, and statistics. Courses in labor law, collective bargaining, labor economics, labor history, and industrial psychology provide valuable backgound for the prospective labor relations worker.

Graduate study in industrial or labor relations is often required for work in labor relations. Although a law degree seldom is required for entry level jobs, most of the people who are responsible for contract negotiations are lawyers, and a combination of industrial relations courses and a law degree is becoming highly desirable.

A college education, though highly important, is not the only way to enter personnel work. Some clerks advance to professional positions through experience. However, part-time college courses are useful.

New personnel workers usually enter formal or on-the-job training programs to learn how to classify jobs, interview applicants, or administer employee benefits. Next, new workers are assigned to specific areas in the employee relations department, to gain experience. Later, they may advance within their own company, transfer to another employer, or move from personnel to labor relations work.

A growing number of people enter the labor relations field directly, as trainees. They usually are graduates of master's degree programs in industrial relations, or may have a law degree. Quite a few people, however, begin in personnel work, gain experience in that area, and subsequently move into a labor relations job.

Workers in the middle ranks of a large organization often transfer to a top job in a smaller one. Employees with exceptional ability may be promoted to executive positions, such as director of personnel or director of labor relations.

Personnel and labor relations workers should speak and write effectively and be able to work with people of all levels of education and experience. They also must be able to see both the employee's and the employer's points of view. In addition, they should be able to work as part of a team. They need supervisory abilities and must be able to accept responsibility. Integrity, fairmindedness, and a persuasive, congenial personality are all important qualities.

Employment Outlook

The number of personnel and labor relations workers is expected to grow faster than the average for all occupations through the 1980's, as employers, increasingly aware of the benefits to be derived from good labor-management relations, continue to support sound, capably staffed employee relations programs. In addition to new jobs created by growth of the occupation, many openings will occur as workers die, retire, or leave their jobs for other reasons.

Legislation setting standards for employment practices in areas of occupational safety and health, equal employment opportunity, and pensions has stimulated demand for personnel and labor relations workers. Continued growth is foreseen, as employers throughout the country review existing programs in each of these areas and, in many cases, establish entirely new ones. This has created job opportunities for people who have appropriate expertise. The effort to end discriminatory employment practices, for example, has led to scrutiny of the testing, selection, placement, and promotion procedures in many companies and government agencies. The findings are causing a number of employers to modify these procedures, and to take steps to raise the level of professionalism in their personnel departments.

Substantial employment growth is foreseen in public personnel administraton. Opportunities probably will be best in State and local government. By contrast, Federal employment will grow slowly. Moreover, as union strength among public employees continues to grow, State and local agencies will need many more workers qualified to deal with labor relations. Enactment of collective bargaining legislation for State and local government employees could greatly stimulate demand for labor relations workers knowledgeable about public sector negotiations.

Although the number of jobs in both personnel and labor relations is projected to increase over the next decade, competition for these jobs also is increasing. Particularly keen competition is anticipated for jobs in labor relations. A small field, labor relations traditionally has been difficult to break into, and opportunities are best for applicants with a master's degree or a strong undergraduate major in industrial relations, economics, or business. A law degree is an asset.

Earnings

Beginning job analysts in private industry started at about $12,000 a year in 1978, according to a Bureau of Labor Statistics survey. Experienced job analysts earned $22,600, about twice the average for all nonsupervisory workers in private industry, except farming. Wage and salary administrators earned about $22,100 and personnel managers averaged $23,600, according to a survey conducted by the Administrative Management Society. Top personnel and labor relations executives in large corporations earned considerably more.

Average salaries for personnel specialists employed by State governments ranged from $11,000 to $14,500 a year in 1978, according to a survey conducted by the U.S. Office of Personnel Management. Personnel specialists who had supervisory responsibilities averaged from $16,200 to $21,600 and State directors of personnel earned average salaries ranging from $31,000 to $36,000.

In the Federal Government, new graduates with a bachelor's degree generally started at about $10,000 a year in 1978. Those with a master's degree started at about

Table 1. Average salaries of Federal personnel and labor relations workers in selected specialties, 1978

Specialty	Annual salary
Mediator	$33,892
Personnel management specialist	24,174
Employee development specialist	23,796
Position classifier	22,777
Occupational analyst	22,578
Salary and wage administrator	21,843
Staffing specialist	21,447

SOURCE: U.S. Office of Personnel Management.

$15,300. Average salaries of Federal employees in several different areas of personnel and labor relations work ranged from about $21,400 to $33,800 in 1978, as shown in the accompanying table.

Related Occupations

All of the personnel and labor relations occupations are, of course, closely related to each other. Other workers who help people find satisfactory jobs or help to make the work environment safe and pleasant include health and regulatory inspectors, occupational safety and health workers, lawyers, employment counselors, rehabilitation counselors, college career planning and placement counselors, industrial engineers, psychologists, and sociologists. All of these occupations are described in other chapters of the *Handbook*.

Sources of Additional Information

For general information on careers in personnel and labor relations work, write to:

American Society for Personnel Administration, 30 Park Dr., Berea, Ohio 44017.

For information concerning a career in employee training and development, contact:

American Society for Training and Development, P.O. Box 5307, Madison, Wis. 53705.

A brochure describing a career in labor-management relations as a field examiner is available from:

Director of Personnel, National Labor Relations Board, 1717 Pennsylvania Ave. NW., Washington, D.C., 20570.

Pharmacists

(D.O.T. 074.161)

Nature of the Work

Pharmacists dispense drugs and medicines prescribed by medical and dental practitioners and supply and advise people on the use of many medicines that can be obtained with and without prescriptions. Pharmacists must understand the use, composition, and effect of drugs and often test them for purity and strength. They may maintain patient medication profiles and advise physicians on the proper selection and use of medicines. Compounding—the actual mixing of ingredients to form powders, tablets, capsules, ointments, and solutions—is now only a small part of pharmacists' practice, since most medicines are produced by manufacturers in the form used by the patient.

Many pharmacists employed in community pharmacies also have other duties. Besides dispensing medicines, some pharmacists buy and sell nonpharmaceutical merchandise, hire and supervise personnel, and oversee the general operation of the pharmacy. Other pharmacists, however, operate prescription pharmacies that dispense only medicines, medical supplies, and health accessories.

Pharmacists in hospitals and clinics dispense prescriptions and advise the medical staff on the selection and effects of drugs; they also make sterile solutions, buy medical supplies, teach in schools of nursing and allied health professions, and perform administrative duties. In addition, pharmacists work as consultants to the medical team in matters related to daily patient care in hospitals, nursing homes, and other health care facilities. Their role is crucial to safe, efficient, and proper therapeutic care.

Some pharmacists, employed as sales or medical service representatives by drug manufacturers and wholesalers, sell medicines to retail pharmacies and to hospitals, and inform health personnel about new drugs. Others teach in colleges of pharmacy, supervise the manufacture of pharmaceuticals, or are involved in research and the development of new medicines. Some pharmacists edit or write technical articles for pharmaceutical journals, or do administrative work. Some combine pharmaceutical and legal training in jobs as patent lawyers or consultants on pharmaceutical and drug laws.

Working Conditions

Pharmacists usually work in a clean, well-lighted, and well-ventilated area that resembles a small laboratory. Shelves are lined with hundreds of different medicines and drugs. In addition, some items are refrigerated and all controlled substances are kept under lock and key.

According to a recent survey, pharmacists average 44 hours a week in their primary work setting. Many pharmacists work in a secondary setting where they average 15 hours a week, often as a consultant to a nursing home or other facility. Pharmacies often are open in the evenings and on weekends, and all States require a registered pharmacist to be in attendance during pharmacy hours. Self-employed pharmacists often work more hours than those in salaried positions.

Places of Employment

About 135,000 persons worked as licensed pharmacists in 1978. About 100,000 pharmacists worked in community pharmacies. Of these, about one-third owned their own pharmacies; the others were salaried employees. Most of the remaining pharmacists worked for hospitals, pharmaceutical manufacturers, wholesalers, and government and educational institutions. Quite a few community and hospital pharmacists do consulting work for nursing homes and other health facilities in addition to their primary jobs. As a rule, pharmacy services in nursing homes are provided by consultants rather than by salaried employees.

Some pharmacists are civilian employees of the Federal Government who work chiefly in hospitals and clinics of the Veterans Administration and the U.S. Public Health Service. Additional Federal agencies employing pharmacists include the Department of Defense, the Food and Drug Administration and other branches of the Department of Health, Education, and Welfare, and the Drug Enforcement Administration. Other pharmacists serve in the Armed Forces or teach in colleges of pharmacy. State and local health agencies and pharmaceutical and other professional associations also employ pharmacists.

Most towns have at least one pharmacy with one pharmacist or more in attendance. Most pharmacists, however, practice in or near cities and in those States that have the largest populations.

Training, Other Qualifications, and Advancement

A license to practice pharmacy is required in all States and the District of Columbia. To obtain a license, one must graduate from an accredited pharmacy degree program, pass a State board examination and—in all States—have a specified amount of practical experience or internship under the supervision of a licensed pharmacist. Internships generally are served in a community or hospital pharmacy. In 1978, all States except California, Florida, and Hawaii granted a license without reexamination to qualified pharmacists already licensed by another State. Many pharmacists are licensed to practice in more than one State.

At least 5 years of study beyond high school are required to graduate from one of the degree programs accredited by the American Council on Pharmaceutical Education in the 72 colleges of pharmacy. Most graduates receive a Bachelor of Science (B.S.) or a Bachelor of Pharmacy (B. Pharm.) de-

Pharmacist fills prescription.

gree. About one-third of the colleges of pharmacy also offer advanced professional degree programs leading to a Doctor of Pharmacy (Pharm. D.) degree; three of the schools offer only the Pharm. D. degree. The Pharm. D. degree as well as the B.S. and B. Pharm. degrees may serve as the entry degree for licensure as a pharmacist.

Admission requirements vary. A few colleges admit students directly from high school. Most colleges of pharmacy, however, require entrants to have completed 1 or 2 years of prepharmacy education in an accredited junior college, college, or university. A prepharmacy curriculum usually emphasizes mathematics and basic sciences, such as chemistry, biology, and physics, but also includes courses in the humanities and social sciences. Because entry requirements vary among colleges of pharmacy, prepharmacy students should inquire about and follow the curriculum required by colleges they plan to attend.

The bachelor's degree in pharmacy is the minimum educational qualification for most positions in the profession. An increasing number of students are enrolled in advanced professional programs leading to the Pharm. D. degree. A master's or Ph. D. degree in pharmacy or a related field usually is required for research work and a Pharm. D., master's, or Ph. D. usually is necessary for administrative work or college teaching. Although a number of pharmacy graduates interested in further training pursue an advanced degree in pharmacy, there are other options. Some enter medical, dental, or law school, and others pursue graduate degrees in science or engineering.

Areas of special study include pharmaceutics and pharmaceutical chemistry (physical and chemical properties of drugs and dosage forms), pharmacology (effects of drugs on the body), pharmacognosy (drugs derived from plant or animal sources), hospital pharmacy, clinical pharmacy, and pharmacy administration. Clinical pharmacy is the synthesis of the basic science education and the application of this knowledge to drug management problems in the care of patients. Courses in pharmacy administration are particularly helpful to pharmacists who become executives or managers.

All colleges of pharmacy offer courses in pharmacy practice, designed to educate students in the skilled processes required for compounding and dispensing prescriptions, and to give students an appreciation for the profession and an understanding of the responsibilities pharmacists have in their relationships with physicians and patients. Many college programs of pharmacy increasingly are emphasizing direct patient care as well as consultative services to other health professionals.

A limited number of Federal scholarships and loans are available for students studying full time toward a degree in pharmacy. In addition, scholarships are awarded annually by drug manufacturers, chain drugstores, corporations, State and national pharmacy associations, colleges of pharmacy, and other organizations.

Since many pharmacists are self-employed, prospective pharmacists interested in this type of practice should have some business capability, interest in medical science, and the ability to gain the confidence of clients. Honesty, integrity, and orderliness are important attributes for the profession. In addition, accuracy is needed to compound and dispense medicines as well as keep records required by law.

Pharmacists often begin as employees in community pharmacies. After they gain experience and obtain the necessary funds, they may become owners or part owners of pharmacies. A pharmacist who gains experience in a chain drugstore may advance to a managerial position, and later to a higher executive position within the company. Hospital pharmacists who have the necessary training and experience may advance to director of pharmacy service or to other administrative positions. Pharmacists in industry often have opportunities for advancement in management, sales, research, quality control, advertising, production, packaging, and other areas.

Employment Outlook

The employment outlook for pharmacists is expected to be favorable through the 1980's. However, if the number of pharmacy graduates continues to rise as rapidly as it has in recent years, graduates may experience competition for jobs. Employment growth is expected to be faster than the average for all occupations. Additional openings will result from deaths, retirements, and other separations from the labor force.

Employment will grow as new pharmacies are established in large residential areas, small towns, and rural locations. Many community pharmacies are expected to hire additional pharmacists because of a trend towards shorter working hours. Demand for pharmacists also will be generated by such factors as population growth; increased life expectancy; greater demand for drugs, particularly among the elderly; availability of a wider range of drug products for preventive and therapeutic uses; the rising standard of health care; and the growth of public and private health insurance programs that provide payment for prescription drugs.

Employment of pharmacists in hospitals and other health facilities is expected to rise faster than in other work settings. Pharmacists increasingly provide direct patient care and consultative services to physicians and other professionals in health facilities. Pharmacists with advanced training will be needed for college teaching and top administrative posts.

Earnings

Salaries of pharmacists are generally influenced by the location, size, and type of employer, as well as the duties and responsibilities of the position. The average starting salary for pharmacists working in hospitals was about $17,000 a year in 1978, according to a national survey conducted by the University of Texas Medical Branch; experienced hospital pharmacists averaged about $21,000 a year. Pharmacists who do consulting work in addition to their primary job may have total earnings considerably higher than this. Experienced pharmacists, particularly owners or managers of pharmacies, often earn considerably more.

The minimum entrance salary in the Federal Government for a new graduate with a bachelor's degree from an approved pharmacy degree program was about $13,000 a year in 1979. However, most graduates qualified for a beginning salary of about $15,900 a year; those with 2 years of graduate work, about $19,300 a year. Pharmacists with additional years of experience may start at a higher salary. The average salary for all federally employed pharmacists was about $20,800 in 1978.

According to a survey conducted by the American Association of Colleges of Pharmacy, average annual salaries of full-time personnel in colleges of pharmacy during 1978 were as follows: deans, about $42,000; assistant and associate deans, about $32,000; full professors, around $33,000; associate professors, around $26,000; and assistant professors, about $22,000.

Related Occupations

Pharmacists fill the prescriptions of physicians, dentists, and other health practitioners and are responsible for selecting, compounding, dispensing, and preserving drugs and medicines. Workers in other professions requiring similar educational training and who work with pharmaceutical compounds or perform related duties include pharmaceutical bacteriologists, pharmaceutical chemists, pharmaceutical-compounding supervisors, and pharmacologists.

Sources of Additional Information

Additional information on pharmacy as a career, preprofessional and professional requirements, programs offered by colleges of pharmacy, and student financial aid is available from:

American Association of Colleges of Pharmacy, Office of Student Affairs, 4630 Montgomery Ave., Suite 201, Bethesda, Md. 20014.

General information on pharmacy is available from:

American Pharmaceutical Association, 2215 Constitution Ave. NW., Washington, D.C. 20037.

Information about chain drugstores is available from:

National Association of Chain Drug Stores, 1911 Jefferson Davis Highway, Arlington, Va. 22202.

General information on retail pharmacies is available from:

National Association of Retail Druggists, 1750 K St. NW., Washington, D.C. 20006.

For a list of accredited colleges of pharmacy, contact:

American Council on Pharmaceutical Education, One East Wacker Dr., Chicago, Ill. 60601.

Information on requirements for licensure in a particular State is available from the Board of Pharmacy of that State or from:

National Association of Boards of Pharmacy, One East Wacker Dr., Suite 2210, Chicago, Ill. 60601.

Information on college entrance requirements, curriculums, and financial aid is available from the dean of any college of pharmacy.

Photographers

(D.O.T. 143.062-014, -022, -026, -030, and -034; 143.362-010 and -014; and 143.457-010)

Nature of the Work

Photographers use their cameras and film to portray people, places, and events much as a writer uses words. Those who are skillful can capture the personality of individuals or the mood of scenes which they photograph. Some photographers specialize in scientific, medical, or engineering photography, and their pictures enable thousands of persons to see a world normally hidden from view.

Although their subject matter varies widely, all photographers use the same basic equipment. The most important piece, of course, is the camera, and most photographers own several. Unlike snapshot cameras, which have a lens permanently attached to the camera body, professional cameras are generally constructed to use a variety of lenses designed for close-up, medium-range, or distance photography.

Besides cameras and lenses, photographers use a variety of film and colored filters to obtain the desired effect under different lighting conditions. When taking pictures indoors or after dark, they may use electronic flash units, floodlights, reflectors, and other special lighting equipment.

Some photographers develop and print their own photographs in the darkroom and may enlarge or otherwise alter the basic image. Many photographers send their work to laboratories for processing.

Because the procedures involved in still photography are quite different from those in motion picture photography, many photographers specialize in one or the other. However, the demand is growing for photographers who have training in both areas.

In addition to knowing how to use equipment and materials, photographers must be able to compose the subjects of their photographs and recognize a potentially good photograph.

Many photographers specialize in a particular type of photography, such as portrait, commercial, or industrial work. *Portrait photographers* (D.O.T. 143.062-030) take pictures of individuals or groups of persons and often work in their own studios. For special events, such as weddings or christenings, however, they take photographs in churches and homes. Portrait photographers in small studios frequently do all the operations, including scheduling appointments and setting up and adjusting equipment before taking the pictures, as well as developing and retouching negatives, developing proofs, and mounting and framing pictures. They also may collect payments and keep records, and therefore must be good business persons.

Commercial photographers (D.O.T. 143.-062-030) photograph a wide range of subjects including livestock, manufactured articles, buildings, and large groups of people. They frequently do photography for catalogs. Those in advertising take pictures to promote items such as clothing, furniture, automobiles, and food, and may specialize in one such area. Advertising photographers must know how to use many different photographic techniques.

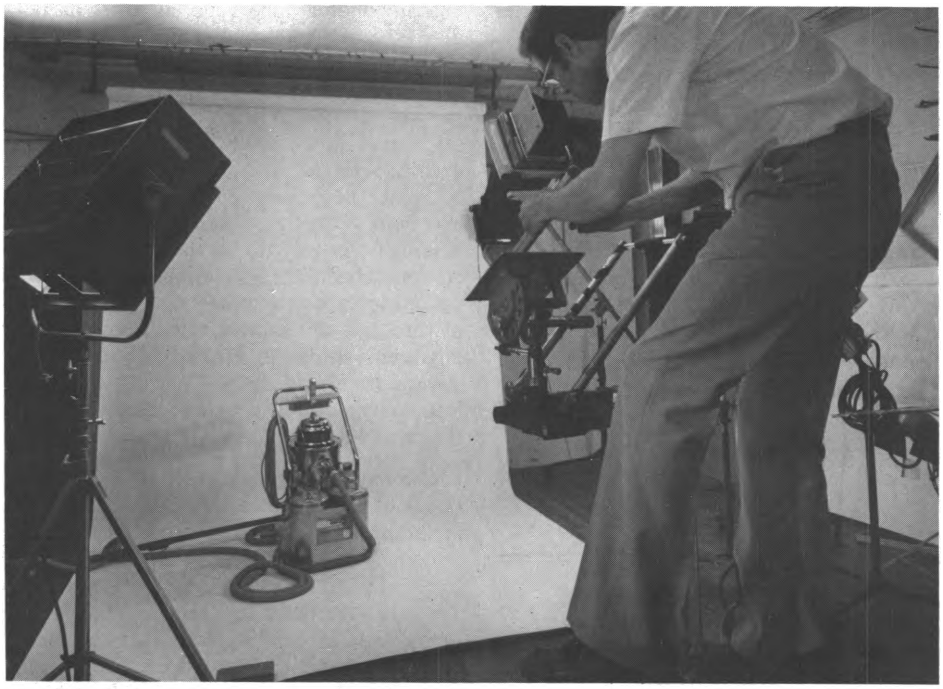
Industrial photographers (D.O.T. 143.062-030) are involved in a wide variety of activity. Companies use their work in publications to report to stockholders or to advertise company products or services. Industrial photographers also photograph groups of people for employee news magazines or take motion pictures of workers operating equipment and machinery for management's use in analyzing production or work methods. They may also use special photographic techniques as research tools. For example, medical researchers often use ultraviolet and infrared photography, fluorescence, and X-rays to obtain information not visible under normal conditions. Time-lapse photography (where time is stretched or condensed), photomicrography (where the subject of the photography may be magnified 50 or 70 times or more), and photogrammetry (surveying an area using aerial photography) are other special techniques.

Photojournalists (D.O.T. 143.062-034) photograph newsworthy events, places, people, and things for publications such as newspapers and magazines or for television news shows. They may also prepare educational slides, filmstrips, and movies for use in the classroom.

Working Conditions

Working conditions for photographers vary. Those who have salaried jobs usually work a 5-day, 35-40 hour week. Photographers in business for themselves usually work longer hours. Depending upon the employment, working hours for freelance photographers vary.

Freelance, press, and commercial photographers travel frequently and may work in uncomfortable surroundings. Sometimes the



Commercial photographers use many different techniques and types of equipment.

work can be dangerous, especially for photojournalists assigned to cover stories on natural disasters or military conflicts.

Many photographers work under pressure. Deadlines and demanding customers must be satisfied. Freelance photographers may find soliciting new clients frustrating and tedious.

Places of Employment

About 93,000 photographers were employed in 1978. The greatest proportion worked in commercial studios; many others worked for newspapers and magazines. Government agencies, photographic equipment suppliers and dealers, and industrial firms also employed large numbers of photographers. In addition, some taught in colleges and universities, or made films. Still others worked freelance, taking pictures to sell to advertisers, magazines, and other customers. About one-third of all photographers were self-employed.

Jobs for photographers are found in all parts of the country—both small towns and large cities—but are concentrated in the more populated areas.

Training, Other Qualifications, and Advancement

Although a high school education is desirable, photography has no set entry requirements for formal education or training. Employers usually seek applicants who have a broad technical understanding of photography as well as other photographic talents, such as imagination, creativity, and a good sense of timing. Technical expertise can be obtained through practical experience, post-secondary training, or some combination of the two. Some jobs do require that applicants specialize areas outside of photography.

Photographic training is available in colleges, universities, junior colleges, and art schools. About 75 colleges and universities offer 4-year curriculums leading to a bachelor's degree in photography. Some colleges and universities grant master's degrees in specialized areas, such as photojournalism. In addition, some colleges have 2-year curriculums leading to a certificate or an associate degree in photography. A formal education in photography gives a solid fundamental background in a variety of equipment, processes, and techniques. Art schools offer useful training in design and composition, but not the technical training needed for professional photographic work. The Armed Forces also train many young people in photographic skills.

People may prepare for work as photographers in a commercial studio through 2 or 3 years of on-the-job training as a photographer's assistant. Trainees generally start in the darkroom where they learn to mix chemicals, develop film, and do photoprinting and enlarging. Later they may set up lights and cameras or help an experienced photographer take pictures.

Amateur experience is helpful in getting an entry job with a commercial studio, but post-high school education and training usually are needed for industrial or scientific photography. Here success in photography depends on being more than just a competent photographer, and adequate career preparation requires some knowledge of the field in which the photography is used. For example, work in scientific, medical, and engineering research, such as photographing microscopic organisms, requires a background in the particular science or engineering specialty as well as skill in photography.

Photographers must have good eyesight and color vision, artistic ability, and manual dexterity. They also should be patient and accurate and enjoy working with detail. Some knowledge of mathematics, physics, and chemistry is helpful for understanding the use of various lenses, films, light sources, and development processes.

Some photographic specialties require additional qualities. Commercial or freelance photographers must be imaginative and original in their thinking. Those who specialize in photographing news stories must recognize a potentially good photograph and act quickly; otherwise, an opportunity to capture an important event on film may be lost. Writing ability sometimes is important for photojournalists, who may write captions and accompanying articles for their photographs. Photographers who specialize in portrait photography need the ability to help people relax in front of the camera.

Newly hired photographers are given relatively routine assignments that do not require split-second camera adjustments or decisions on what subject matter to photograph. News photographers, for example, may be assigned to cover civic meetings or photograph snow storms. After gaining experience they advance to more demanding assignments, and some may move to staff positions on national news magazines. Photographers with exceptional ability may gain national recognition for their work and exhibit their photographs in art and photographic galleries, or publish them in books. A few industrial or scientific photographers may be promoted to supervisory positions. Magazine and news photographers may eventually become heads of graphic arts departments or photography editors.

Employment Outlook

Employment of photographers is expected to grow about as fast as the average for all occupations through the 1980's. In addition to openings resulting from increased demand for photographers, others will occur each year as workers die, retire, or transfer to other occupations.

Employment may grow as business and industry place greater importance upon visual aids in meetings, stockholders' reports, sales campaigns, and public relations work. Video and motion picture photography are becoming increasingly important in industry. Photography also is becoming an increasingly important part of law enforcement work, as well as scientific and medical research, where opportunities are expected to be good for those possessing a highly specialized background.

The employment of portrait and commercial photographers is expected to grow slowly, and competition for jobs as portrait and commercial photographers and photographers' assistants is expected to be keen. These fields are relatively crowded since photographers can go into business for themselves with a modest financial investment, or

work part time while holding another job. Increased use of self-processing cameras in commercial photography also has contributed to crowding in this field, since little training is required for such work.

Earnings

Beginning photographers who worked for newspapers that have contracts with The Newspaper Guild had weekly earnings between $135 and $457 in early 1979, with the majority earning between $200 and $275. Newspaper photographers with some experience (usually 4 or 5 years) averaged about $368 a week in early 1979. Almost all experienced newspaper photographers earned over $250; the topsalary was $560 a week.

Photographers in the Federal Government earned an average of $16,500 a year in 1978. Depending on their level of experience, newly hired photographers in the Federal Government earned from $9,390 to $13,010 a year. Most experienced photographers earned between $13,010 and $19,260 a year.

Experienced photographers generally earn salaries that are above the average for nonsupervisory workers in private industry, except farming. Although self-employed and freelance photographers often earn more than salaried workers, their earnings are affected greatly by general business conditions and the type and size of their community and clientele.

Related Occupations

Besides photographers, other workers who rely on their visual arts talents in their jobs include commercial artists, floral designers, illustrators, industrial designers, painters, and sculptors.

Sources of Additional Information

Career information on photography is available from:

Professional Photographers of America, Inc., 1090 Executive Way, Des Plaines, Ill. 60018.

Physical Therapists

(D.O.T. 076.121-014)

Nature of the Work

Physical therapists help persons with muscle, nerve, joint, and bone diseases or injuries to overcome their disabilities. Their patients include accident victims, handicapped children, and disabled older persons. Physical therapists perform and interpret tests and measurements for muscle strength, motor development, functional capacity, and respiratory and circulatory efficiency to develop programs for treatment in cooperation with the patient's physician. They evaluate the effectiveness of the treatment and discuss patient's progress with physicians, psychologists, occupational therapists, and other specialists. When advisable, physical therapists revise the therapeutic procedures and treatments. They help disabled persons accept their physical handicaps and adjust to them. They also teach patients and their families how to continue treatments at home.

Therapeutic procedures include exercises for increasing strength, endurance, coordination, and range of motion; electrical stimulation to activate paralyzed muscles; instruction in carrying out everyday activities and in the use of helping devices; and the application of massage, heat, cold, light, water, or electricity to relieve pain or improve the condition of muscles and skin.

Most physical therapists provide direct care to patients as staff members, supervisors, or self-employed practitioners. Physical therapists usually perform their own evaluations of patients; in large hospitals and nursing homes, however, the director or assistant director of the physical therapy department may handle this work, which requires extensive training and experience. Therapists may treat patients with a wide variety of problems, or they may specialize in pediatrics, geriatrics, orthopaedics, sports medicine, neurology, or cardiopulmonary diseases. Others teach or are consultants.

Working Conditions

Physical therapists generally work in pleasant surroundings. Evening and weekend hours may be required, especially for those in private practice who must be available at times convenient for their patients. The job can be physically exhausting. In addition to standing for long periods, therapists must move equipment and help patients turn, stand, or walk.

Places of Employment

About 30,000 persons worked as licensed physical therapists in 1978. The largest number work in hospitals. Nursing homes employ a growing number of physical therapists and also contract for the services of self-employed therapists. Other therapists work in rehabilitation centers or schools for handicapped children. Some who work for public health agencies treat chronically sick patients in their own homes. Still others work in physicians' offices or clinics, teach in physical therapy educational programs, or work for research organizations. A few serve as consultants in government and voluntary agencies or are members of the Armed Forces.

Training, Other Qualifications, and Advancement

All States, the District of Columbia, and the Commonwealth of Puerto Rico require a license to practice physical therapy. Applicants for a license must have a degree or certificate from an accredited physical therapy educational program and, to qualify, must pass a State licensure examination. Applicants may prepare for State licensure examinations in physical therapy through one of three types of programs, depending upon previous academic study. High school graduates can earn a 4-year bachelor's degree in physical therapy at a college or university. Students who already hold a bachelor's degree in another field, such as biology or physical education, can earn a second bachelor's degree, or a certificate, or an entry level master's degree in physical therapy.

In 1979, 13 certificate programs, 74 bachelor's degree programs and 9 master's degree programs were accredited by the American Physical Therapy Association and the American Medical Association to provide entry level training. There were also 19 other master's degree programs and 4 doctoral degree programs that provided advanced training to those already in the field. One of the master's degree programs is sponsored jointly by the U.S. Army and Baylor University; graduates are commissioned as officers in the Army.

The physical therapy curriculum includes science courses such as anatomy, physiology, neuroanatomy, and neurophysiology; it also includes specialized courses such as biomechanics of motion, human growth and development, and manifestations of disease and trauma. Besides receiving classroom instruction, students get supervised clinical experience administering physical therapy to patients in hospitals and other treatment centers.

Competition for entry to all physical therapy programs is keen. Institutions offering a physical therapy program each year receive many more applications than the number of existing places. Consequently, students seriously interested in attending a physical therapy program must attain superior grades in their earlier studies, especially in science courses. High school courses that are useful include health, biology, chemistry, social science, mathematics, and physics.

Personal traits that physical therapists need include patience, tact, resourcefulness, and emotional stability to help patients and their families understand the treatments and adjust to their handicaps. Physical therapists also should have manual dexterity and physical stamina. Many persons who want to determine whether they have the personal qualities needed for this occupation volunteer for summer or part-time work in the physical therapy department of a hospital or clinic.

A graduate degree combined with clinical experience increases opportunities for advancement, especially to teaching, research, and administrative positions.

Employment Outlook

Employment of physical therapists is expected to grow much faster than the average for all occupations through the 1980's because of increased public recognition of the importance of rehabilitation. As programs to aid handicapped children and other rehabilitation activities expand, and as growth takes

A physical therapist's work can often be very rewarding.

place in nursing homes and other facilities for the elderly, many new positions for physical therapists are likely to be created.

Persons seeking physical therapy postions may face some competition, however. If recent trends continue, the number of new graduates is expected to exceed the number of openings that will result each year from expansion in this field and from replacement of those who die or retire. Opportunities should be best in suburban and rural areas. Many part-time positions should continue to be available.

Earnings and Working Conditions

Starting salaries for new physical therapy graduates averaged about $13,000 a year in 1978, according to a national survey conducted by the University of Texas Medical Branch. Earnings of experienced physical therapists averaged about $16,000, with some earning as much as $27,000 a year.

Beginning therapists employed by the Veterans Administration (VA) earned starting salaries of $11,700 a year in 1979. The average salary paid therapists employed by the VA in 1978 was about $17,200 annually; supervisory therapists may earn over $23,000.

Related Occupations

Physical therapists are concerned with the treatment and rehabilitation of persons with physical or mental disabilities or disorders. They may use exercise, massage, heat, water, electricity, and various therapeutic devices to help their patients gain independence. Other workers who perform similar duties include occupational therapists, speech pathologists and audiologists, orthotists, prosthetists, and respiratory therapists.

Sources of Additional Information

Additional information on a career as a physical therapist and a list of accredited educational programs in physical therapy are available from:

American Physical Therapy Association, 1156 15th St. NW., Washington, D.C. 20005.

Physicians

(D.O.T. 070.061-010 through .107-014)

Nature of the Work

Physicians perform medical examinations, diagnose diseases, and treat people who are suffering from injury or disease. They also advise patients on how to prevent disease and keep fit through proper diet and exercise. Physicians generally work in their own offices and in hospitals, but they also may visit patients in their homes or in nursing homes.

A decreasing percentage of the physicians who provide patient care are general practitioners (about 15 percent in 1978); most specialize in 1 of about 40 fields for which there is postgraduate training. The largest specialties are internal medicine, general surgery, obstetrics and gynecology, psychiatry, pediatrics, radiology, anesthesiology, ophthalmology, pathology, and orthopedic surgery. The most rapidly growing specialties are in the primary care area—family practice, internal medicine, obstetrics-gynecology, and pediatrics.

Some physicians combine the practice of medicine with research or teaching in medical schools. Others hold full-time research or teaching positions or perform administrative work in hospitals, professional associations, and other organizations. A few are primarily engaged in writing and editing medical books and magazines.

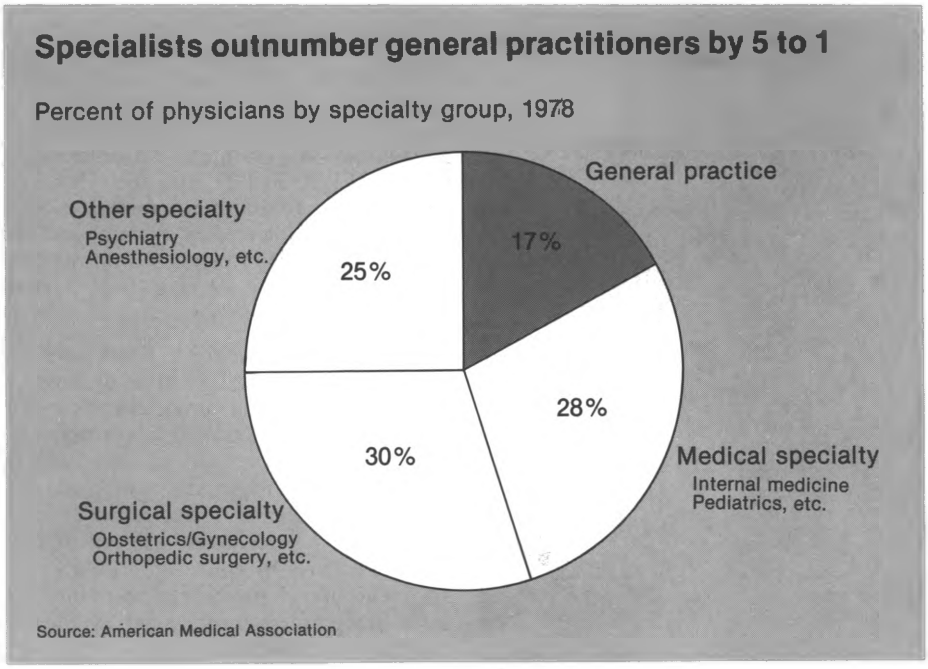
Working Conditions

Many physicians have long working days and irregular hours. Most specialists work fewer hours each week than general practitioners. As doctors grow older, they may accept fewer new patients and tend to work shorter hours. However, many continue in practice well beyond 70 years of age.

Place of Employment

About 385,000 physicians were professionally active in the United States in 1978—almost 9 out of 10 providing patient care services. About 220,000 of these had office practices; more than 105,000 others worked as residents or full-time staff member in hospitals. The remaining physicians—more than 32,000—taught or performed administrative or research duties.

In 1978, 10,000 graduates of foreign medical schools served as hospital residents in this country. To be appointed to approved resi-



dencies in U.S. hospitals, alien graduates of foreign medical schools must pass the Visa Qualifying Examination offered by the Educational Commission for Foreign Medical Graduates.

The Northeastern States have the highest ratio of physicians to population and the Southern States the lowest. Because physicians have tended to locate in urban areas, close to hospital and educational centers, many rural areas have been underserved by medical personnel. Currently, more medical students are being exposed to practice in rural communities with the direct support of educational centers and hospitals in more populous areas. In addition, some rural areas offer physicians guaranteed minimum incomes to offset the relatively low earnings typical in rural medical practice.

Training and Other Qualifications

All States, the District of Columbia, and Puerto Rico require a license to practice medicine. Requirements for licensure include graduation from an accredited medical school, successful completion of a licensing examination, and, in most States, a period of 1 or 2 years in an accredited graduate medical education program (residency). The licensing examination taken by most graduates of U.S. medical schools is the National Board of Medical Examiners (NBME) test that is accepted by all States except Texas. Graduates of foreign medical schools as well as graduates of U.S. medical schools who have not taken the NBME test must take the Federation Licensure Examination (FLEX) that is accepted by all jurisdictions. Although physicians licensed in one State usually can get a license to practice in another without further examination, some States limit this reciprocity.

In 1978, there were 124 accredited schools in the United States in which students could begin the study of medicine. Of these, 123 awarded the degree of Doctor of Medicine (M.D.); 1 school offered a 2-year program in the basic medical sciences to students who could then transfer to another medical school for the last semesters of study.

The minimum educational requirement for entry to a medical school is 3 years of college; some schools require 4 years. A few medical schools allow selected students who have exceptional qualifications to begin their professional study after 2 years of college. Most students who enter medical schools have a bachelor's degree.

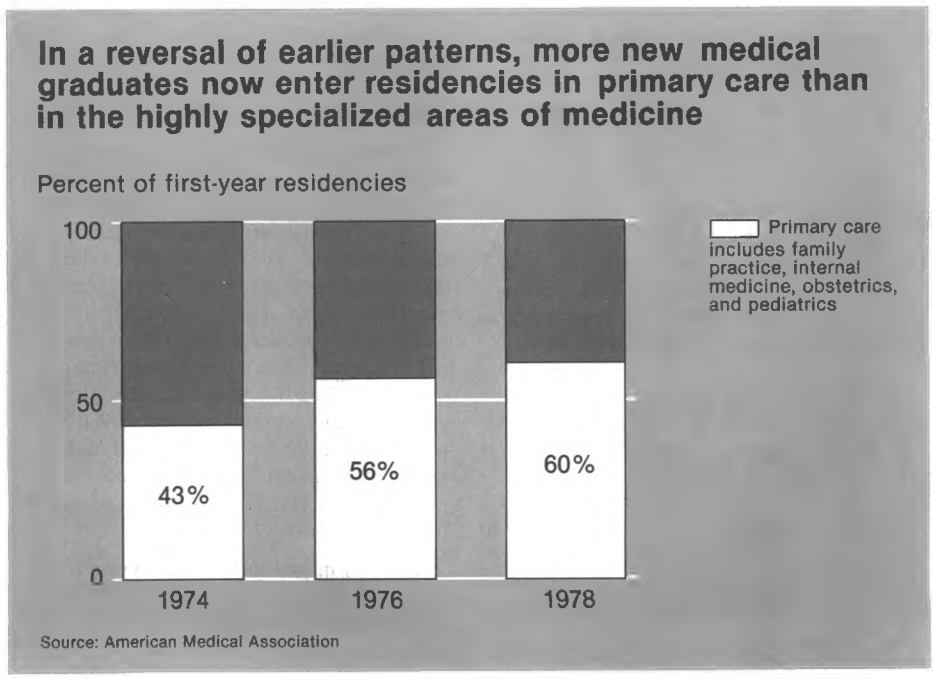
Required premedical study includes undergraduate work in English, physics, biology, and inorganic and organic chemistry. Students also should take courses in the humanities, mathematics, and the social sciences to acquire a broad general education.

Medicine is a popular field of study, and competition for entry to medical school is intense. In 1978, there were about 40,500 applicants for only 16,000 positions. Almost all of those accepted had premedical college grades averaging "B" or better. Other factors considered by medical schools in admitting students include their scores on the New Medical College Admission Test, which is taken by almost all applicants. Consideration also is given to the applicant's character, personality, and leadership qualities, as shown by personal interviews, letters of recommendation, and extracurricular activities in college. Many State-supported medical schools give preference to residents of their particular State and, sometimes, those of nearby States.

Most medical students take 4 years to complete the curriculum for the M.D. degree. Some schools, however, allow students who have demonstrated outstanding ability to follow a shortened curriculum, generally lasting 3 years. A few schools offer the M.D. degree within 6 years of high school graduation.

The first semesters of medical school are spent primarily in laboratories and classrooms, learning basic medical sciences such as anatomy, biochemistry, physiology, pharmacology, microbiology, and pathology. Additionally, students gain some clinical experience with patients during the first 2 years of study, earning to take case histories, perform examinations, and recognize diseases. During the last semesters, students spend the majority of their time in hospitals and clinics under the supervision of clinical faculty, where they become experienced in the diagnosis and treatment of illness.

After graduating from medical school, almost all M.D.'s serve a 1- or 2-year residency. Those planning to work in general



One of the fastest growing medical specialties is family practice.

practice often spend an additional year in a hospital residency. Those seeking certification in a specialty spend from 2 to 4 years—depending on the specialty—in advanced residency training, followed by 2 years of practice or more in the specialty. Then they must pass the specialty board examinations. Some physicians who want to teach or do research take graduate work leading to a master's or Ph. D. degree in a field such as biochemistry or microbiology.

Medical training is very costly because of the long time required to earn the medical degree. However, financial assistance in the form of loans and scholarships is available primarily from the Federal Government, and to a lesser extent from State and local government and private sources. Some of this aid requires the student to commit a minimum of 2 years' time to Federal service upon graduation and/or to establish financial need.

Persons who wish to become physicians must have a strong desire to serve the sick and injured. They must be willing to study a great deal in order to keep up with the latest advances in medical science. Sincerity and a pleasant personality are assets that help physicians gain the confidence of patients. Physicians also should be emotionally stable and able to make decisions in emergencies.

The majority of newly qualified physicians open their own offices or join associate or group practices. Those who have completed 1 year of graduate medical education (a 1-year residency) and enter active military duty initially serve as captains in the Army or Air Force or as lieutenants in the Navy. Graduates of medical schools are eligible for commissions as senior assistant surgeons in the U.S. Public Health Service, with a salary equivalent to that of an Army captain. Graduates also qualify for Federal Civil Service professional medical positions.

Employment Outlook

The employment outlook for physicians is expected to be favorable through the 1980's. However, medical school enrollments increased dramatically during the 1970's, and these graduates, combined with foreign medical graduates seeking to practice here, will greatly improve the supply of physicians. Moreover, a greater percentage of new medical graduates are entering the primary care specialties, and this may help alleviate a critical shortage in many localities. With more physicians in primary care there may be an increasing movement of physicians into rural and other areas that have experienced shortages in the past.

Growth in population will create much of the need for more physicians, and a larger percentage of the population will be in the age group over 65, which uses more physicians' services. Also, the effective demand for physicians' care will increase because of greater ability to pay, resulting from extension of prepayment programs for hospitalization and medical care, including Medicare and Medicaid, and continued Federal Government provision of medical care for members of the Armed Forces, their families, and veterans. In addition, more physicians will be needed for medical research and for the growing fields of public health, rehabilitation, industrial medicine, and mental health.

To some extent, the rise in the demand for physicians' services will be offset by developments that will enable physicians to care for more patients. For example, increasing numbers of medical technicians are assisting physicians; new drugs and new medical techniques are shortening illnesses; and growing numbers of physicians are using their time more effectively by engaging in group practice. The use of physicians' assistants and nurse practitioners also may increase the productivity of physicians.

Although the expected increase in the number of phyisians and in the productivity is likely to result in greater availability of medical care, new physicians should have little difficulty establishing a practice.

Earnings

Stipends of medical school graduates serving as residents in hospitals vary according to the type of residency, geographic area, and size of the hospital, but allowances of $13,000 to $14,000 a year are common. Many hospitals also provide full or partial room, board, and other maintenance allowances to their residents.

Graduates who had completed approved 3-year residencies but had no other medical experience, received a starting salary at Veterans' Administration hospitals of about $32,500 a year in 1979. In addition, those working full time received up to $7,000 in other cash benefits or "special" payments.

Newly qualified physicians who establish their own practice must make a sizable financial investment to equip a modern office. During the first year or two of independent practice, physicians probably earn little more than the minimum needed to pay expenses. As a rule, however, their earnings rise rapidly as their practices develop.

Physicians have the highest average annual earnings of any occupational group. A survey of private, office-based M.D.'s, conducted by *Medical Economics* magazine, reported a median net income of $65,400 in 1977. Historically, most specialists, such as radiologists and surgeons, have earned much more than family or general practitioners. However, earnings of family practitioners in recent years have risen sharply. The average of family practitioners' incomes was 90 percent of that for general surgeons in 1977. Earnings of physicians depend on factors such as the region of the country in which they practice; the patients' income levels; and

the physicians' skills, personality, and professional reputation, as well as the length of experience. Self-employed physicians usually earn more than those in salaried positions.

Related Occupations

Physicians work to prevent, diagnose, and treat diseases, disorders, and injuries. Other occupations that require similar kinds of skill and critical judgment include audiologists, chiropractors, dentists, optometrists, osteopathic phsyicians, podiatrists, speech pathologists, and veterinarians.

Sources of Additional Information

Persons who wish to practice in a State should find out about the requirements for licensure directly from the board of medical examiners of that State. Information on Federal scholarships and loans is available from the directors of student financial aid at medical schools. For a list of approved medical schools, as well as general information on premedical education, financial aid, and medicine as a career, contact:

Council on Medical Education, American Medical Association, 535 N. Dearborn St., Chicago Ill. 60610.

Association of American Medical Colleges, Suite 200, One Dupont Circle, NW., Washington, D.C. 20036.

Physicists

(D.O.T. 023.061-014 and .067-010)

Nature of the Work

The flight of astronauts through space, the probing of ocean depths, and even the safety of the family car depend on research by physicists. Through systematic observation and experimentation, physicists describe in mathematical terms the structure of the universe and interaction of matter and energy. Physicists develop theories that describe the fundamental forces and laws of nature. Determining the basic laws governing phenomena such as gravity, electromagnetism, and nuclear interaction leads to discoveries and innovations. For instance, the development of irradiation therapy equipment which destroys harmful growths in humans without damaging other tissues resulted from what physicists know about nuclear radiation. Physicists have contributed to scientific progress in recent years in areas such as nuclear energy, electronics, communications, aerospace, and medical instrumentation.

The majority of all physicists work in research and development. Some do basic research to increase scientific knowledge. For example, they investigate the structure of the atom or the nature of gravity. The equipment that physicists design for their basic research can often be applied to other areas. For example, lasers (devices that amplify light and emit electromagnetic waves in a narrow, intense light beam) are utilized in surgery; microwave devices are used for ovens; and measurement techniques and instruments can detect and measure the kind and number of cells in blood or the amount of mercury or lead in foods.

Some engineering-oriented physicists do applied research and help develop new products. For instance, their knowledge of solid-state physics led to the development of transistors and microcircuits used in electronic equipment that ranges from hearing aids to missile guidance systems.

Many physicists teach and do research in colleges and universities. A small number work in inspection, quality control, and other production-related jobs in industry. Some do consulting work.

Most physicists specialize in one branch or more of the science—elementary-particle physics; nuclear physics; atomic, electron, and molecular physics; physics of condensed matter; optics, acoustics, and plasma physics; and the physics of fluids. Some specialize in a subdivision of one of these branches. For example, solid-state physics subdivisions include ceramics, crystallography, and semiconductors. However, since all physics involves the same fundamental principles, several specialties may overlap.

Growing numbers of physicists are specializing in fields that combine physics and a related science—such as astrophysics, biophysics, chemical physics, and geophysics. Furthermore, the practical applications of physicists' work increasingly have merged with engineering.

Working Conditions

Physicists generally work regular hours in laboratories, classrooms, and offices. Most physicists do not encounter unusual hazards in their work.

Places of Employment

Over 40,000 people worked as physicists in 1978. Private industry employed over one-half of all physicists, primarily in companies manufacturing chemicals, electrical equipment, and aircraft and missiles. Many others worked in hospitals, commercial laboratories, and independent research organizations.

Almost one-half of all physicists taught or did research in colleges and universities; some did both. About 5,000 physicists were employed by the Federal Government in 1978, mostly in the Departments of Defense and Commerce.

Although physicists are employed in all parts of the country, their employment is greatest in areas that have heavy industrial concentrations and large college and university enrollments. Nearly one-fourth of all physicists work in four metropolitan areas—Washington, D.C.; Boston, Mass.; New York, N.Y.; and Los Angeles-Long Beach, Calif., and more than one-third are concentrated in three States—California, New York, and Massachusetts.

Training, Other Qualifications, and Advancement

Graduate training in physics or a closely related field is almost essential for most entry level jobs in physics and for advancement in all types of work. The doctorate usually is required for full faculty status at colleges and universities and for industrial or government jobs administering research and development programs.

Those having master's degrees qualify for many research jobs in private industry and in

Physicist "growing" germanium crystals in a laboratory.

the Federal Government. In colleges and universities, some teach and assist in research while studying for their Ph. D.

Those having bachelor's degrees may qualify for some applied research and development jobs in private industry and in the Federal Government. Some are employed as research assistants in colleges and universities while studying for advanced degrees. Many work in engineering and other scientific fields. (See statements on engineers, geophysicists, programmers, and systems analysts elsewhere in the *Handbook*.)

Over 800 colleges and universities offer a bachelor's degree in physics. In addition, many engineering schools offer a physics major as part of the general curriculum. The undergraduate program provides a broad background in the science and serves as a base for later specialization either in graduate school or on the job. Some typical physics courses are mechanics, electricity and magnetism, optics, thermodynamics, and atomic and molecular physics. Students also take courses in chemistry and many courses in mathematics.

About 275 colleges and universities offer advanced degrees in physics. In graduate school, the student, with faculty guidance, usually works in a specific field. The graduate student, especially the candidate for the Ph. D. degree, spends a large portion of his or her time in research.

Students planning a career in physics should have an inquisitive mind, mathematical ability, and imagination. They should be able to work on their own, since physicists, particularly in basic research, often receive only limited supervision.

Physicists often begin their careers doing routine laboratory tasks. After some experience, they are assigned more complex tasks and may advance to work as project leaders or research directors. Some work in top management jobs. Physicists who develop new products sometimes form their own companies or join new firms to exploit their own ideas.

Employment Outlook

Employment opportunities in physics are expected to be favorable through the 1980's for persons with graduate degrees in physics. Although employment of physicists is projected to grow more slowly than the average for all occupations over the period, fewer physics graduates are expected to enter the labor force than in the past. The number of graduate degrees awarded annually in physics has been declining since 1970, and may remain at about the current level through 1990. Most job openings will arise as physicists retire, die, or transfer to other occupations.

Many physicists work in research and development (R&D). The anticipated increase in R&D expenditures through the 1980's should result in increased requirements for physicists. If actual R&D expenditure levels and patterns differ significantly from those assumed, however, the outlook would be altered.

Some physicists with advanced degrees will be needed to teach in colleges and universities, but competition for these jobs is expected to be keen. Since employment growth is not anticipated in this area, most openings will occur to replace physicists who retire, die, or transfer to other occupations.

Persons with only a bachelor's degree in physics are expected to face keen competition for physicist jobs through the 1980's. Some new graduates will find employment as engineers or technicians. Others will find opportunities as high school physics teachers after completing the required educational courses and obtaining a State teaching certificate. However, they are usually regarded as teachers rather than as physicists. (See statement on secondary school teachers elsewhere in the *Handbook*.)

Earnings

Physicists have relatively high salaries, with average earnings more than twice those of nonsupervisory workers in private industry, except farming. According to an American Institute of Physics Survey in 1978, starting salaries for physicists in manufacturing industries averaged about $17,400 for those with a master's degree and $23,000 for those with a Ph. D.

Depending on their college records, physicists with a bachelor's degree could start in the Federal Government in 1977 at either $10,507 or $13,014 a year. Beginning physicists having a master's degree could start at $13,014 or $15,920, and those having the Ph. D. degree could begin at $19,263 or $23,087. Average earnings for all physicists in the Federal Government in 1978 were $30,200 a year.

Starting salaries on college and university faculties for physicists having a master's degree averaged $12,900 in 1978, and for those having the Ph. D., $13,900, according to the American Institute of Physics. (See statement on college and university faculty elsewhere in the *Handbook*.) Many faculty physicists supplement their regular incomes by working as consultants and taking on special research projects.

Related Occupations

Physics is closely related to astronomy and other scientific occupations such as chemists, geologists, and geophysicists. Engineers and engineering and science technicians also use a knowledge of the principles of physics in their work.

Sources of Additional Information

General information on career opportunities in physics is available from:

American Institute of Physics, 335 East 45th St., New York, N.Y. 10017.

Podiatrists

(D.O.T. 079.101-022)

Nature of the Work

Podiatrists diagnose and treat diseases and deformities of the foot. They perform surgery, fit corrective devices, and prescribe drugs, physical therapy, and proper shoes. To help in diagnoses, they take X-rays and perform or prescribe blood and other pathological tests. Podiatrists treat a variety of foot conditions, including corns, bunions, calluses, ingrown toenails, skin and nail diseases, deformed toes, and arch disabilities. Whenever podiatrists find symptoms of a medical disorder affecting other parts of the body—arthritis, diabetes, or heart disease, for example—they refer the patient to a physician while continuing to treat the foot problem.

Some podiatrists specialize in foot surgery, orthopedics (bone, muscle, and joint disorders), podopediatrics (children's foot ailments), or podogeriatrics (foot problems of the elderly). However, more than four of every five are generalists, who provide all types of foot care.

Working Conditions

Podiatrists usually work independently in their own offices. Their workweek is generally 40 hours, and they may set their hours to suit their practice.

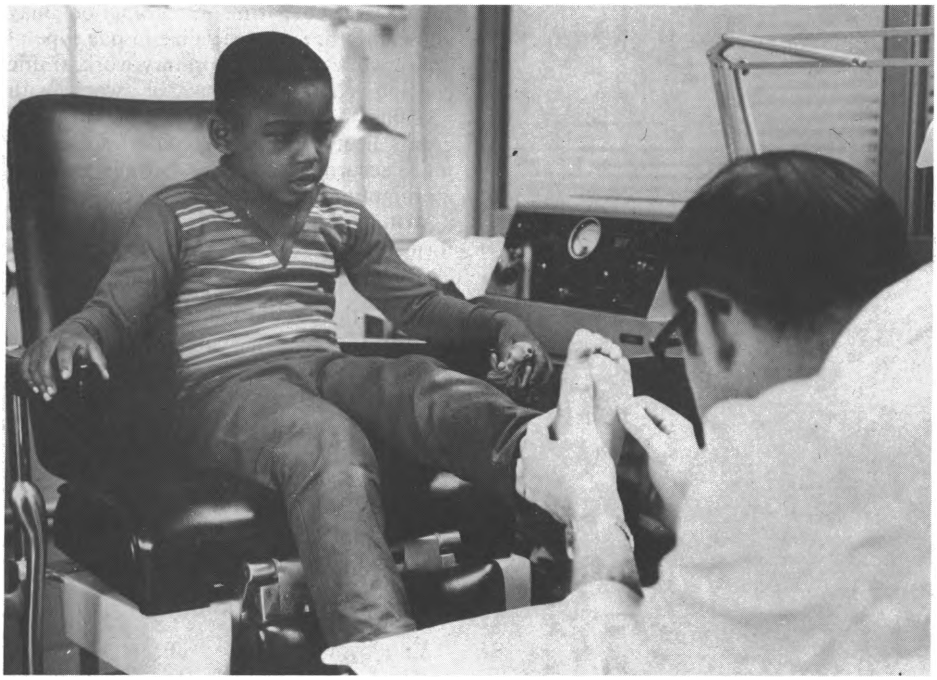
Places of Employment

Of the 8,100 podiatrists active in 1978, the majority were located in large cities. Those who had full-time salaried positions worked mainly in hospitals, podiatric medical colleges, or for other podiatrists. The Veterans' Administration and public health departments employ podiatrists on either a full- or part-time basis. Others serve as commissioned officers in the Armed Forces.

Training, Other Qualifications, and Advancement

All States and the District of Columbia require a license for the practice of podiatry. To qualify for a license, an applicant must graduate from an accredited college of podiatric medicine and pass a written and oral State board proficiency examination. Four States—Georgia, Michigan, New Jersey, and Rhode Island—also require applicants to serve a 1-year residency in a hospital or clinic after graduation. Three-fourths of the States grant licenses without further examination to podiatrists licensed by another State.

The five colleges of podiatric medicine are located in California, Illinois, New York, Pennsylvania, and Ohio. Minimum entrance requirements at these schools include 3 years of college work with courses in English, chemistry, biology or zoology, physics, and mathematics. Competition for entry to these schools is strong, however, and most entrants



Podiatrists diagnose and treat foot problems.

surpass the minimum requirements. About 90 percent of the class entering in 1978 held at least a bachelor's degree, and the average enrollee had an overall grade point average of 'B' or better. All colleges of podiatric medicine require applicants to take the New Medical College Admissions Test. Of the 4 years in podiatry school, the first 2 are spent in classroom instruction and laboratory work in anatomy, bacteriology, chemistry, pathology, physiology, pharmacology, and other basic sciences. During the final 2 years, students obtain clinical experience while continuing their academic studies. The degree of Doctor of Podiatric Medicine (D.P.M) is awarded upon graduation. Additional education and experience generally are necessary to practice in a specialty. Federal, State, and private loans are available for needy students to pursue full-time study leading to a degree in podiatric medicine.

Persons planning a career in podiatry should have scientific aptitude and manual dexterity, and like detailed work. A good business sense and congeniality also are assets in the profession.

Most newly licensed podiatrists set up their own practices. Some purchase established practices, or obtain salaried positions to gain the experience and money they need to begin their own.

Employment Outlook

Opportunities for graduates to establish new practices, as well as to enter salaried positions, should be favorable through the 1980's.

Employment of podiatrists is expected to grow faster than the average for all occupations as podiatry gains recognition as a healing art and as an expanding population demands more health services. The growing number of older people who need foot care and who are entitled to certain podiatrists' services under Medicare also is expected to spur demand.

Earnings

Newly licensed podiatrists build their practices over a number of years. Income during the first several years is low but generally rises significantly as the practice grows. A net income of over $40,000 a year is common for established podiatrists. Newly licensed podiatrists hired by Veterans' Administration hospitals earned starting salaries between $19,263 and $25,041 in 1978.

Related Occupations

Podiatrists work to prevent, diagnose, and treat human foot diseases, disorders, and injuries. Other occupations that require similar skills include audiologists, chiropractors, dentists, optometrists, osteopathic physicians, physicians, speech pathologists, and veterinarians.

Sources of Additional Information

Information on license requirements in a particular State is available from that State's board of examiners in the State capital.

Information on colleges of podiatric medicine, entrance requirements, curriculums, and student financial aid is available from:

American Association of Colleges of Podiatric Medicine, 20 Chevy Chase Circle, NW., Washington, D.C. 20015.

For additional information on podiatry as a career, contact:

American Podiatry Association, 20 Chevy Chase Circle, NW., Washington, D.C. 20015.

Police Officers

(D.O.T. 375 except .167-026, -042, .263-018, and .363-010; and 377 except 377.667-010)

Nature of the Work

The security of our Nation's cities and towns greatly depends on the work of local police officers and sheriffs' deputies whose jobs range from controlling traffic to preventing and investigating crimes. Whether on or off duty, these officers are expected to exercise their authority whenever necessary.

Police officers and sheriffs' deputies who work in small communities and rural areas have many duties. In the course of a day's work, they may direct traffic at the scene of a fire, investigate a housebreaking, and give first aid to an accident victim. In a large police department, by contrast, officers usually are assigned to a specific type of duty. Most officers are detailed either to patrol or to traffic duty; smaller numbers are assigned to special work such as accident prevention or operation of communications systems. Others work as detectives (plainclothes officers) assigned to criminal investigation; still others, as experts in chemical and microscopic analysis, firearms identification, and handwriting and fingerprint identification. In very large cities, a few officers may work with special units such as mounted and motorcycle police, harbor patrols, helicopter patrols, canine corps, mobile rescue teams, and youth aid services.

Most new recruits begin on patrol duty. Recruits may be assigned to such varied areas as congested business districts or outlying residential areas. They may cover their beats alone or with other officers. They may ride in a police vehicle or walk on "foot" patrol. In any case, they become thoroughly familiar with conditions throughout their area and, while on patrol, remain alert for anything unusual. They note suspicious circumstances, such as open windows or lights in vacant buildings, as well as hazards to public safety such as burned-out street lights or fallen trees. Officers also watch for stolen automobiles and enforce traffic regulations. At regular intervals, they report to police headquarters through call boxes, by radio, or by walkie-talkie. They prepare reports about their activities and may be called on to testify in court when cases result in legal action.

Working Conditions

The scheduled workweek for police officers usually is 40 hours. Because police protection must be provided around the clock in all but the smallest communities, some officers are on duty over weekends, on holidays, and at night. Police officers are subject to call any time their services are needed and may work overtime in emergencies.

Police officers may have to work outdoors for long periods in all kinds of weather. The injury rate is higher than in many occupa-

Police officers on traffic duty investigate accidents and enforce traffic regulations.

tions and reflects the risks officers take in pursuing speeding motorists, capturing lawbreakers, and dealing with public disorder.

Places of Employment

About 450,000 full-time officers worked for local police departments in 1978. Some cities have very large police forces. For example, New York has about 25,000 police officers and Chicago has nearly 13,000. Hundreds of small communities employ fewer than 25 officers each.

Training, Other Qualifications, and Advancement

Local civil service regulations govern the appointment of police officers in practically all large cities and in many small ones. Candidates must be U.S. citizens, usually at least 21 years of age, and must meet certain height and weight standards. Eligibility for appointment depends on performance in competitive examinations as well as on education and experience. The physical examinations often include tests of strength and agility.

Because personal characteristics such as honesty, good judgment, and a sense of responsibility are especially important in police work, candidates are interviewed by a senior officer at police headquarters, and their character traits and background are investigated. In some police departments, candidates also may be interviewed by a psychiatrist or a pyschologist, or be given a personality test. Although police officers work independently, they must perform their duties in line with laws and departmental rules. They should enjoy working with people and serving the public.

In large police departments, where most jobs are found, applicants usually must have a high school education. A few cities require some college training and some hire law enforcement students as police interns. A few police departments accept applicants who have less than a high school education as recruits, particularly if they have worked in a field related to law enforcement.

More and more, police departments are encouraging applicants to take post-high school training in sociology and psychology. In 1978, more than 800 junior colleges, colleges, and universities offered programs in law enforcement or criminal justice. Other courses helpful in preparing for a police career include English, American history, civics and government, business law, and physics. Physical education and sports are especially helpful in developing the stamina and agility needed for police work.

In some large cities, young persons who have completed high school can enter police work as police cadets, or trainees, while still in their teens. As paid civilian employees of the police department, they attend classes to learn police skills and do clerical work. They may be appointed to the regular force at age 21 if they have all the necessary qualifications.

Before their first assignments, officers usually go through a period of training. In small communities, recruits learn by working for a short time with experienced officers. Training provided in large city police departments is more formal and may last several weeks or a few months. This training includes classroom instruction in constitutional law and civil rights; in State laws and local ordinances; and in accident investigation, patrol, and traffic control. Recruits learn how to use a gun, defend themselves from attack, administer first aid, and deal with emergencies.

Police officers usually become eligible for promotion after a specified length of service. In a large department, promotion may allow an officer to specialize in one type of police work such as laboratory work, traffic control, communications, or work with juveniles. Promotions to the rank of sergeant, lieutenant, and captain usually are made according to a candidate's position on a promotion list, as determined by scores on a written examination and on-the-job performance.

Many types of training help police officers improve their performance on the job and prepare for advancement. Through training given at police department academies and colleges, officers keep abreast of crowd-control techniques, civil defense, legal developments that affect their work, and advances in law enforcement equipment. Many police departments encourage officers to work toward college degrees, and some pay all or part of the tuition.

Employment Outlook

Employment of police officers is expected to grow about as fast as the average for all occupations through the 1980's as the Nation's population and police protection needs increase. Employment growth will be tempered by increased use of civilian police department employees in traffic control, parking enforcement, administration, and other routine, nonhazardous areas of police work.

Police work is attractive to many. The job frequently is challenging and involves much responsibility. Furthermore, layoffs are rare. Although the written examinations and strict physical requirements always eliminate many applicants, competition is expected to be keen for job openings through the 1980's. The outlook should be good for persons having some college training in law enforcement.

Earnings

In early 1978, entry level salaries for police officers employed in medium- and large-sized cities averaged nearly $13,200 a year, although they varied widely from city to city. In some smaller communities, officers started at less than $9,000 a year, while some major cities offered over $15,000 a year to new employees. Most officers receive regular salary increases during the first few years of employment until they reach a set maximum for their rank. Maximum earnings averaged $16,650 a year in early 1978, and exceeded $18,000 a year in some areas. Promotion to a higher rank brings a higher basic salary. In general, police officers were paid about one and one-half times as much as nonsupervisory workers in private industry, except farming.

Police departments usually provide officers with special allowances for uniforms and furnish revolvers, night sticks, handcuffs, and other required equipment. Because police officers generally are covered by liberal pension plans, many retire at half pay after 20 years of service.

Related Occupations

Police officers maintain law and order in the Nation's cities, towns, and rural areas. Other related law enforcement occupations include State police officers, FBI special agents, Internal Revenue Service agents, Secret Service agents, Border Patrol agents, fire marshals, and fish and game wardens.

Sources of Additional Information

Information about entrance requirements may be obtained from local civil service commissions or police departments.

Political Scientists

(D.O.T. 051, 059.267-010, and 090.227-010)

Nature of the Work

Political scientists study political behavior and institutions. Although some specialize in political theory or philosophy, most political scientists, particularly those specializing in public administration, concern themselves with the organization and operation of government at all levels in the United States and abroad. They explore such phenomena as public opinion, political parties, elections, and special interest groups. They also focus on the workings of the bureaucracy, the Presidency, Congress, and the judicial system. Processes and techniques of public administration and public policymaking also are concerns of political scientists.

Political scientists examine political and administrative behavior in order to aid government leaders and others trying to develop policies and plan programs that meet a society's needs. Like other social scientists, political scientists are research-oriented and base their theories on a systematic analysis of the data they collect. Depending on the topic under study, a political scientist might conduct a public opinion survey, analyze election results, or compare the principal features of various tax proposals. Some areas of political science research are highly quantitative, and involve the use of sophisticated simulation and modeling techniques.

Most political scientists work in colleges and universities. They may combine research or administrative duties with teaching, and often they do consulting work as well. (For more information, see the *Handbook* statement on college and university faculty.)

Some political scientists are primarily researchers or consultants in nonacademic organizations. They might survey public opinion on a current issue, explore the political and administrative ramifications of a government reorganization, or suggest ways of mobilizing support for a particular candidate, policy, or administrative change. The results of political science research are used by public officials, political parties, government administrators, legislative staffs and committees, citizens' groups, legislative reference bureaus, taxpayers' associations, and business firms.

Because of their understanding of political institutions and political and administrative processes, political scientists are well qualified for jobs in and out of government. Many are employed in government management and staff positions; others are employed by legislatures and courts; still others are involved in government relations. Here they may work as lobbyists or consultants for government liaison by business firms, trade associations, public interest groups, and other organizations. Some political scientists work as journalists. A few work primarily as advisors to candidates for political office.

Working Conditions

Political scientists employed in colleges and universities have flexible work schedules, dividing their time among teaching, research, and administrative responsibilities. Those employed by government agencies and private firms, on the other hand, have much more structured schedules. They study and interpret data, prepare reports, confer with coworkers, and meet with government officials, business executives, and others. Many experience the pressures of deadlines, tight schedules, and heavy workloads, and sometimes must work overtime. They may travel to interview people, conduct surveys, attend meetings and conferences, and present reports.

Political scientists on foreign assignment must adjust to unfamiliar cultures and climates. Those in the diplomatic service work long and irregular hours, both in the office and in many social activities considered part of the job.

Places of Employment

About 14,000 persons worked as political scientists in 1978. About four-fifths worked in colleges and universities. Most of the remainder worked for government agencies, consulting firms, political organizations, research institutes, public interest groups, or business firms. This employment estimate does not include all those trained as political scientists who work in government and the private sector in administrative positions or as journalists and other related positions.

Political scientists can be found in nearly every college or university town since courses in government and political science are taught in almost all institutions of higher education. Since the national headquarters of many associations, unions, and other organizations are located in Washington, D.C., this area attracts a sizable number of political scientists in research or policy jobs.

Government employs political scientists both domestically and abroad. They deal with legislative or administrative matters in areas such as foreign affairs, international relations, intelligence, housing, economic development, transportation, environmental protection, social welfare, or health. Political scientists also apply their analytical expertise in such fields as marketing, advertising, public relations, personnel, finance, and consumer affairs.

Training, Other Qualifications, and Advancement

Graduate training generally is required for employment as a political scientist. Completion of all the requirements for the Ph. D. degree is the prerequisite for appointment to academic positions in some colleges and universities and is required for a professorship and tenure. However, tenure is becoming increasingly difficult to attain.

Graduates with a master's degree can qualify for teaching positions in junior and community colleges and for administrative and research positions in government, industry, and research or civic organizations. A master's degree in international relations, foreign service, or foreign area study provides a suitable background for Federal Government positions concerned with foreign affairs. Competence in one or more foreign languages may be important for those who wish to enter the Foreign Service. Minimum requirements for intelligence, foreign affairs, and international relations specialists in the Federal Government generally include a college degree with 24 semester hours in political science, history, economics, or related fields. However, because competition for Federal jobs is keen, additional education or experience may be required. A growing number of applicants for the Foreign Service, for example, have a Ph. D., law degree, or other advanced degree.

People with a bachelor's degree in political science may qualify as trainees in such areas as management, research, administration, sales, and law enforcement. Many students with bachelor's degrees in political science go on to study law, journalism, or some specialized or related branch of political science, such as public administration or international relations.

In 1978, about 1,400 colleges and universities offered a bachelor's degree in political science; around 165, master's programs; about 120, doctoral programs. Approximately 250 schools offered specialties in public administration. Some schools combine political science with another discipline such as history in one department, while others have separate departments of political science, public administration, international studies, or other fields. Some universities have separate schools of public affairs and administration. Colleges and universities strongly recommend field training and internships in government, politics, public service, and similar fields. Internships give students an opportunity to gain experience and make contacts that may be helpful in getting a job later on. However, the number of internships is limited and prospective interns face keen competition.

Undergraduate programs in political sci-

A strong background in political science has been invaluable to these senatorial staff members.

ence include courses in the principles of government and politics, State and local government, comparative studies, political theory, foreign area studies, foreign policy, public administration and policy, political behavior, constitutional, administrative, and international law, and many other offerings. Other courses might deal with the problems of detente, politics of growth and technology, politics of health, legal status of women, international economics, and political warfare in the age of nuclear destruction. A growing number of programs at both the undergraduate and graduate levels offer courses in quantitative and statistical methods, including the use of computers.

Graduate students may specialize in U.S. politics, comparative politics, international politics, foreign area studies, political behavior, political theory, public administration, urban affairs, public policy, and other areas. Doctoral candidates often must exhibit competence in one or more foreign languages and quantitative research techniques.

Persons planning to be political scientists should have qualities that are important in any research or management career. Most important of all are intellectual curiosity—a questioning, probing mind and a keen interest in solving intellectual puzzles—and a commitment to public service. Political scientists also need to be able to think objectively and independently; to handle data carefully and systematically; and to analyze information and ideas. Patience and persistence are important in conducting independent research, and creativity helps in formulating ideas. Because the results of political science research are almost always presented orally or in writing, communication skills are important, too. The ability to write clearly and well is essential.

For some political scientists, an intense interest in political systems and the way they operate is an asset. Active participation in student government, local political campaigns, community newspapers, service clubs, and community activities is recommended for the practical experience and perspective it can provide. Such experience is particularly useful for political scientists who specialize in politics or community organization.

Employment Outlook

Employment of political scientists is expected to increase more slowly than the average for all occupations through the 1980's. Most job openings will result from deaths, retirements, and other separations from the labor force. Colleges and universities, the traditional employers of highly qualified political scientists, are not expected to hire additional faculty members; indeed, as college enrollments decline, some vacancies may remain unfilled.

The number of persons who graduate with advanced degrees in political science will greatly exceed available job openings through the 1980's. Ph. D.'s face stiff competition, particularly for academic jobs. The prestige of the university from which a Ph. D. graduates may be increasingly important in this highly competitive situation. Many Ph. D.'s seeking college teaching jobs are expected to accept part-time, temporary assignments as instructors with little or no hope of gaining tenure. Graduates seeking to enter the Foreign Service also face very stiff competition.

Graduates trained in applied fields such as public administration and public policy should have the best prospects for both academic and nonacademic positions. Persons trained in quantitative research methods and U.S. Government also are in a relatively advantageous position. Those in comparative politics, international relations, and political theory face the most difficult job market. A strong background in economics, marketing, computer science, statistics, and other applied fields increases one's chances for a job in business, industry, or consulting firms.

Master's degree holders face very keen competition for academic positions, but some may find jobs in community and junior colleges. As is the case with Ph. D.'s, graduates trained in public policy or public administration have the best opportunities for jobs in Federal, State, and local government, research bureaus, political organizations, and business firms.

New graduates with a bachelor's degree are expected to find few opportunities for jobs as professional political scientists. Many of these graduates are expected to accept positions as trainees in government, business, and industry. For those planning to continue their studies in law, foreign affairs, journalism, and related fields, political science provides an excellent background. Some new graduates who meet State certification requirements will be able to enter high school teaching.

Earnings

According to the 1977-78 College Placement Council Salary Survey, bachelor's degree candidates in the social sciences received offers averaging around $10,700 a year; master's degree candidates in the social sciences, around $13,200; bachelor's degree candidates offered positions in the field of public administration, around $10,300.

According to an American Political Science Association Survey, the median beginning salaries for new faculty members during academic year 1977-78 were $13,500 for Ph. D.'s and $12,500 for those without a Ph. D. The median salaries of political scientists employed in educational institutions in 1977-78 were around $26,000 for full professors, $18,000 for associate professors, $15,000 for assistant professors, and $13,000 for lecturers and instructors.

According to a survey by the National Research Council, the 1977 median annual salaries of full-time employed Ph. D.'s in social science (includes area studies, political science, public administration, and international relations) were $23,300; in educational institutions, $22,700; in the Federal Government, $32,300; in State and local government, $24,500.

The Federal Government recognizes education and experience in certifying applicants for entry level positions. In general, the entrance salary for those with a bachelor's degree was $10,507 or $13,014 a year in 1979, depending upon the applicant's academic record. The starting salary for those with a master's degree was $15,920 a year, and for those with a Ph. D., $19,263. Intelligence specialists in the Federal Government ave-

raged around $25,800 in 1978; international relations specialists, $32,900; and foreign affairs specialists, $30,300.

Some political scientists, particularly those in college teaching, supplement their income by teaching summer courses or consulting.

Related Occupations

A political scientist's training enables him or her to understand the ways in which political power is amassed and used. Others whose jobs require substantial knowledge of the political process include journalists, lawyers, city managers, Foreign Service Officers, campaign managers, political consultants, pollsters, lobbyists, legislative liaison officers, political aides, and politicians.

Sources of Additional Information

The American Political Science Association, 1527 New Hampshire Ave. NW., Washington, D.C. 20036 offers two career pamphlets, one for undergraduates and one for faculty and graduate students, at $1 each. *A Guide to Graduate Study in Political Science* is available for $5. In addition, a monthly newsletter listing job openings, primarily academic, is available to members of the association.

Programs in Public Affairs and Administration, a directory that contains data on the academic content of programs, the student body, the format of instruction, and other information, may be purchased for $10 from:

National Association of Schools of Public Affairs and Administration, 1225 Connecticut Ave. NW., Suite 306, Washington, D.C. 20036.

For additional information on careers in the Foreign Service, contact:

Board of Examiners, Foreign Service, Box 9317, Rosslyn Station, Arlington, Va. 22209.

For additional information on internships, contact:

National Society for Internships and Experiential Education, 1735 I St. NW., Suite 601, Washington, D.C. 20006.

Programmers

(D.O.T. 020.162-014 and .167-022)

Nature of the Work

Computers can process vast quantities of information rapidly and accurately, but only if they are given step-by-step instructions to follow. Because the machines cannot think for themselves, computer programmers must write detailed instructions called programs that list in a logical order the steps the machine must follow to organize data, solve a problem, or do some other task.

Programmers usually work from problem descriptions prepared by systems analysts who have carefully studied the task that the computer system is going to perform—perhaps organizing data collected in a survey or estimating the stress on portions of a building during a hurricane. These descriptions contain a detailed list of the steps the computer must follow, such as retrieving data stored in another computer, organizing it in a certain way, and performing the necessary calculations. (A more detailed description of the work of systems analysts is contained elsewhere in the *Handbook*). An applications programmer then writes the specific program for the problem, by breaking down each step into a series of coded instructions using one of the languages developed especially for computers.

Some organizations, particularly smaller ones, do not employ systems analysts. Instead, workers called programmer-analysts are responsible for both systems analysis and programming.

Programs vary with the type of problem to be solved. For example, the mathematical calculations involved in payroll accounting procedures are different from those required to determine the flight path of a space probe. A business applications programmer developing instructions for billing customers would first take the company records the computer would need and then specify a solution by showing the steps the computer must follow to obtain old balances, add new charges, calculate finance charges, and deduct payments before determining a customer's bill. The programmer then codes the actual instructions the computer will follow in a high-level programming language, such as COBOL.

Next, the programmer tests the operation of the program to be sure the instructions are correct and will produce the desired information. The programmer tries a sample of the data with the program and reviews the results to see if any errors were made. If errors did occur, the program must be changed and rechecked until it produces the correct results. This is called "debugging" the program.

Finally, an instruction sheet is prepared for the computer operator who will run the program.

Although simple programs can be written in a few hours, programs that use complex mathematical formulas or many data files may require more than a year of work. In some cases, several programmers may work together in teams under a senior programmer's supervision.

Applications programmers are usually business-oriented, engineering-oriented, or science-oriented. A different type of specialist, the systems programmer, maintains the general instructions (called software) that control the operation of the entire computer system. These workers make changes in the sets of instructions that determine the allocation of the computer's resources among the various jobs it has been given. Because of their knowledge of operating systems, systems programmers often help applications programmers determine the source of problems that may occur with their programs.

Working Conditions

Programmers work about 40 hours a week, but their hours are not always from 9 to 5. Once or twice a week a programmer may report early or work late to use the computer when it is available; occasionally, they work on weekends. When a new program is being tested, programmers may get calls from computer operators asking for advice at all hours of the day or night.

Places of Employment

In 1978, about 247,000 persons worked as computer programmers. Most were employed by manufacturing firms, banks and insurance companies, data processing service organizations, and government agencies.

Many programmers work in large firms that need and can afford expensive computer systems. Small firms, which generally require computers only for payroll or billing purposes, often pay data processing service organizations to do this work. Small firms may maintain their own low-cost, small business computers. Systems programmers usually work in research organizations, computer manufacturing firms, and large computer centers.

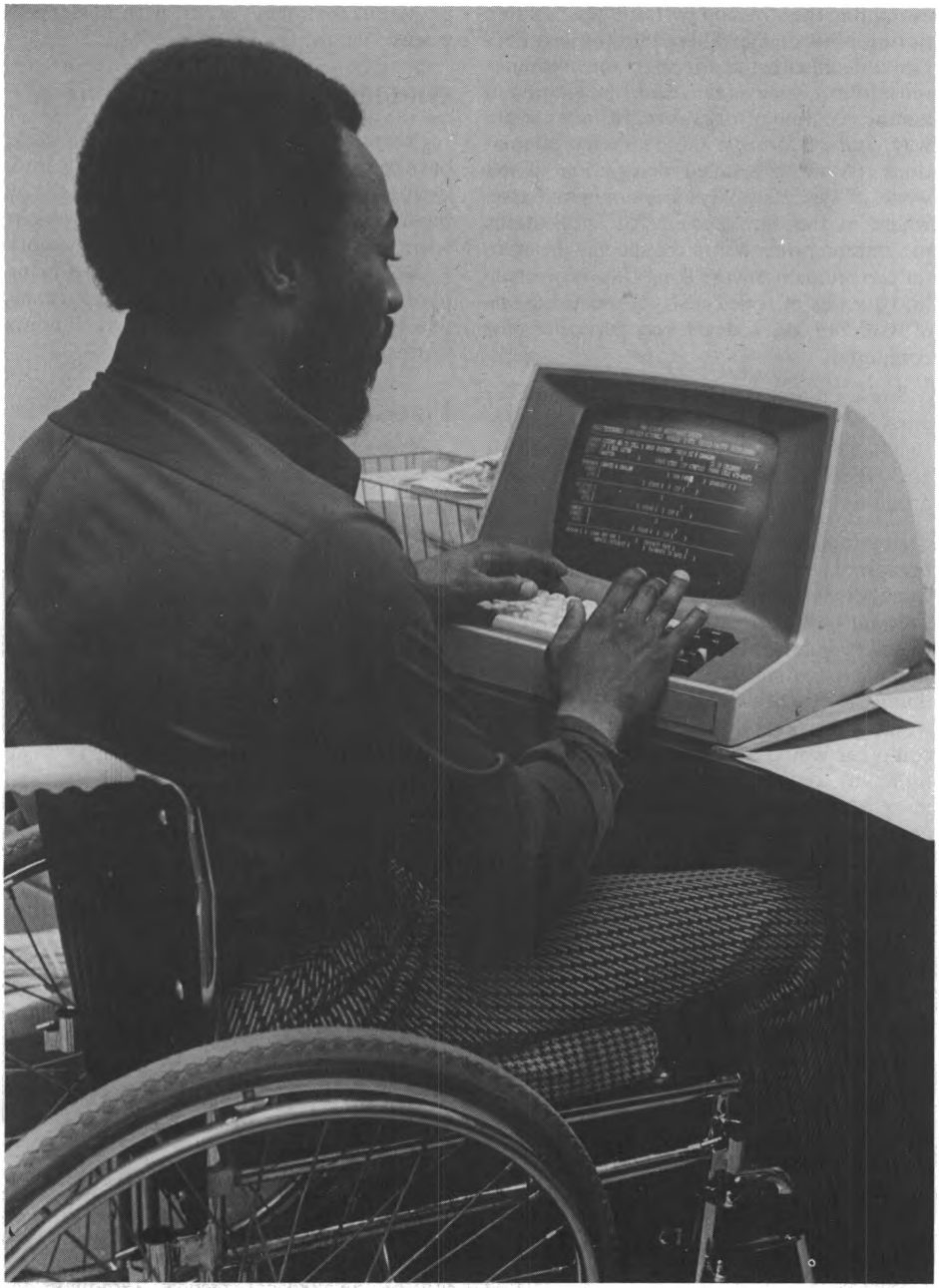
Training, Other Qualifications, and Advancement

There are no universal training requirements for progammers because employers' needs vary. Most programmers are college graduates; others have taken special courses in computer programming to supplement their experience in fields such as accounting or inventory control.

Employers using computers for scientific or engineering applications prefer college graduates who have degrees in computer or information science, mathematics, engineering, or the physical sciences. Graduate degrees are required for some jobs. Very few scientific organizations are interested in applicants who have no college training.

Although some employers who use computers for business applications do not require college degrees, they prefer applicants who have had college courses in data processing, accounting, and business administration. Occasionally, workers who are experienced in computer operation or payroll accounting but have no college training are promoted to programming jobs; however, they need additional data processing courses to become fully qualified programmers. Although it may be preferred, prior work experience is not essential for a job as a programmer; in fact, about half of all entrants to the occupation have no significant work experience.

Computer programming is taught at public and private vocational schools, community and junior colleges, and universities. Instruction ranges from introductory home



Programmers write detailed instructions that list the steps the computers must follow to solve a problem.

study courses to advanced courses at the graduate level. High schools in many parts of the country also offer courses in computer programming.

An indication of experience and professional competence at the senior programmer level is the Certificate in Computer Programming (CCP). This designation is conferred by the Institute for Certification of Computer Professionals upon candidates who have passed a basic five-part examination. In addition, individuals may take another section of the exam in order to specialize in business, science, or systems.

In hiring programmers, employers look for people who can think logically and are capable of exacting analytical work. The job calls for patience, persistence, and the ability to work with extreme accuracy even under pressure. Ingenuity and imagination are particularly important when programmers must find new ways to solve a problem.

Beginning applications programmers usually spend their first weeks on the job attending training classes. After this initial instruction, they work on simple assignments while completing further specialized training programs. Programmers generally must spend at least several months working under close supervision before they can handle all aspects of their job. Because of rapidly changing technology, programmers must continue their training by taking courses offered by their employer and software vendors. For skilled workers, the prospects for further advancement are good. In large organizations, they may be promoted to lead programmers and be given supervisory responsibilities. Some applications programmers may become systems programmers. Both applications programmers and systems programmers often become systems analysts or are promoted to managerial positions.

Employment Outlook

Employment of programmers is expected to grow faster than the average for all occupations through the 1980's as computer usage expands, particularly in firms providing accounting and business management services, and in organizations involved in research and development. In addition to job openings resulting from growth of the occupation, several thousand openings will arise each year from the need to replace workers who leave the occupation. Because many programmers are relatively young, few openings will result from deaths or retirements. However, many vacancies will be created as experienced workers transfer into jobs as systems analysts or managers.

The demand for applications programmers will increase as many processes once done by hand are automated, but employment will not grow as rapidly as in the past for several reasons. Improved software, such as utility programs that can be used by other than data processing personnel, will simplify or eliminate some programming tasks. Also, employment of programmers in data processing firms is not expected to rise as fast as in recent years. Technology has reduced both the size and cost of computer hardware, bringing a computer system within reach of small businesses. As more small firms install their own computer rather than rely on a data processing firm, employment growth in these data processing firms may slow somewhat.

Demand throughout the economy, however, should remain strong over the next decade. Prospects should be brightest for college graduates who have had computer-related courses, particularly for those with a major in computer science or a related field. Graduates of 2-year programs in data processing technologies also should find ample opportunities, although generally limited to business applications.

Earnings

Average weekly earnings of programmer trainees in private industry ranged from $240 to $250 in 1978, according to surveys conducted in urban areas by the Bureau of Labor Statistics and firms engaged in research on data processing occupations. Systems programmers generally earn more than applications programmers, and lead programmers earn more than either systems or applications programmers. For example, experienced systems programmers averaged about $430 a week compared to $360 for applications programmers. Average weekly salaries for lead systems programmers were $465, compared to $415 for lead applications programmers. In the Federal civil service, the entrance salary for persons with a college degree was about $200 a week in 1978. In general, pro-

grammers earn about twice as much as the average earnings of all nonsupervisory workers in private industry, except farming.

Programmers working in the North and West earned somewhat more than those working in the South. Those working for data processing services and public utilities had higher earnings than programmers employed in banks, advertising, or educational institutions.

Related Occupations

Other workers in mathematics, business, and science who solve detailed problems include mathematicians, statisticians, engineers, financial analysts, actuaries, mathematical technicians, and operations research analysts.

Sources of Additional Information

Additional information about the occupation of programmer is available from:

American Federation of Information Processing Societies, 1815 North Lynn St., Arlington, Va. 22209.

Information about the Certificate in Computer Programming is available from:

The Institute for Certification of Computer Professionals, 35 E. Wacker Dr., Suite 2828, Chicago, Ill. 60601.

Psychologists

(D.O.T. 045.061, .067, .107-022, -026, -030, and -034; and 090.227-010)

Nature of the Work

Psychologists study human behavior and mental processes to understand and explain people's actions. Some research psychologists investigate the physical, emotional, or social aspects of human behavior. Others in colleges and universities combine teaching, research, and administration. (For more information, see the *Handbook* statement on college and university faculty.) Still other psychologists in applied fields counsel and conduct training programs; do market research; or administer rehabilitation programs in hospitals or clinics.

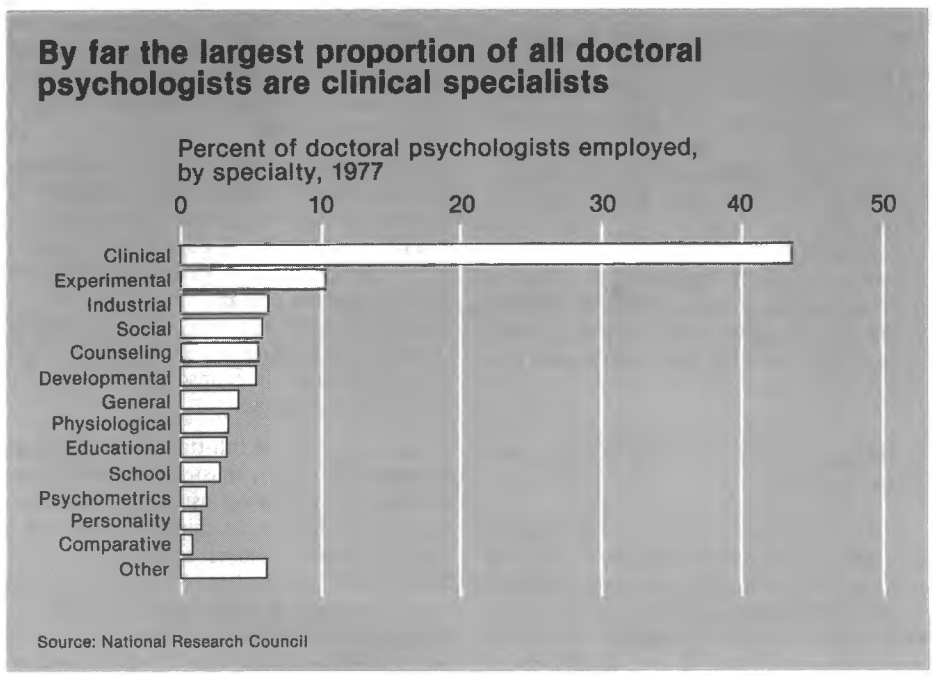
Like other social scientists, psychologists collect and test the validity of data and formulate hypotheses. Research methods depend on the topic under study. Psychologists gather information from controlled laboratory experiments; performance, aptitude, and intelligence tests; observation, interviews, and questionnaires; and surveys.

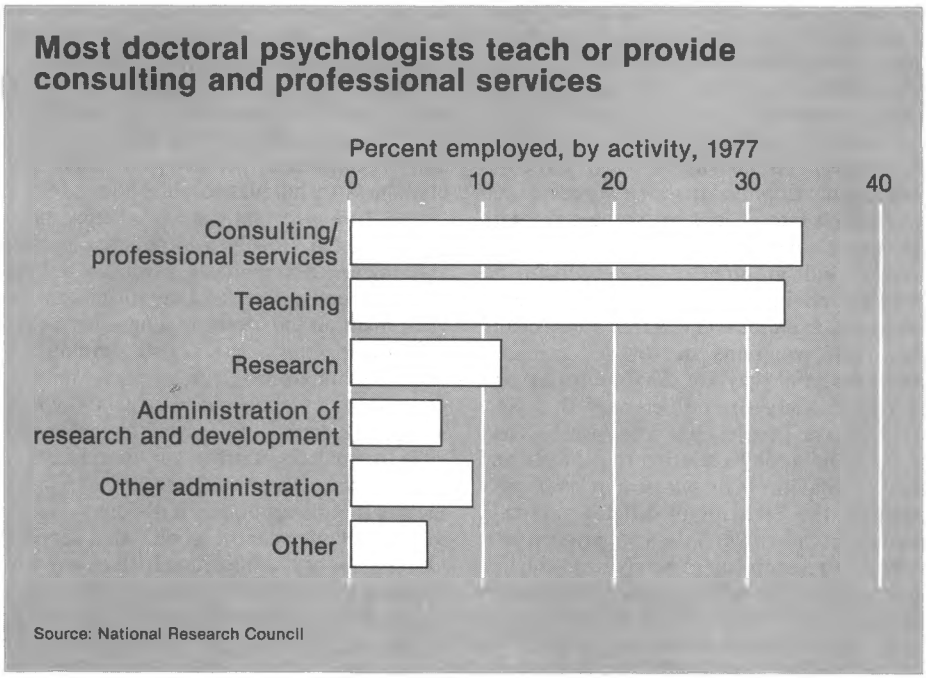
Psychologists usually specialize. *Experimental psychologists* study behavior processes and work with human beings and lower animals such as rats, monkeys, and pigeons; prominent areas of experimental research include motivation, learning and retention, sensory and perceptual processes, and genetic and neurological factors in behavior. *Developmental psychologists* study the patterns and causes of behavioral change as people progress through life; some concern themselves with behavior during childhood, while others study changes that take place during maturity and old age. *Personality psychologists* study human nature, individual differences, and the ways in which those differences develop. *Social psychologists* examine people's interactions with others and with the social environment; prominent areas of study include group behavior, leadership, attitudes, and interpersonal perception. Psychologists in *evaluation research* study health and social programs and try to determine how successful they are. *Environmental psychologists* study the influence of their surroundings on people. *Population psychologists* study demography's relation to personal and social behavior. *Comparative psychologists* compare the behavior of different animals, including man. *Physiological psychologists* study the relationship of behavior to the biological functions of the body. Psychologists in the field of *psychometrics* develop and apply procedures for measuring psychological variables such as intelligence and personality.

Clinical psychology is the largest specialty among doctoral psychologists (see chart). *Clinical psychologists* generally work in hospitals or clinics, or maintain their own practices. They may help the mentally or emotionally disturbed adjust to life. They interview patients; give diagnostic tests; provide individual, family, and group psychotherapy; and design and carry through behavior modification programs. Clinical psychologists may collaborate with psychiatrists and other specialists in developing treatment programs. *Counseling psychologists* use several techniques, including interviewing and testing, to help people with problems of everyday living—personal, social, educational, or vocational. *Educational psychologists* study psychological processes as related to applied problems in education to foster intellectual, social, and emotional development of individuals. *School psychologists* evaluate students' needs and problems, facilitate school adjustment, and help solve learning and social problems in schools. *Industrial and organizational psychologists* apply psychological techniques to personnel administration, management, and marketing problems. They are involved in policy, planning, training and development, psychological test research, counseling, and organizational development and analysis, among other activities. *Engineering psychologists* develop and improve human-machine systems, military equipment, and industrial products. *Community psychologists* apply psychological knowledge to problems of urban and rural life. *Consumer psychologists* study the psychological factors that determine an individual's behavior as a consumer of goods and services. Other areas of specialization include psychology and the arts, history of psychology, psychopharmacology, psychology of women, and military, rehabilitation, and philosophical and health psychology.

Working Conditions

A psychologist's specialty and place of employment determine his or her working conditions. For example, clinical and counseling psychologists in private practice have pleasant, comfortable offices and set their own hours. However, they often must work in the evenings. Some employed in hospitals, nursing homes, and other health facilities also work irregular hours, while others in schools and clinics work regular hours. Engineering psychologists may study work flow and work arrangements in factories or large plants. Experimental psychologists spend much time conducting research on animals in laboratories. Psychologists employed by academic institutions divide their time among teaching, research, and administrative responsibilities.





Some maintain part-time clinical practices as well. In contrast to the many psychologists who have flexible work schedules, some in government and private industry have more structured schedules. Reading and writing research reports, they often work alone behind a desk. Many experience the pressures of deadlines, tight schedules, and heavy workloads, and sometimes must work overtime. Their routine may be interrupted frequently. Travel may be required to attend conferences or conduct research.

Places of Employment

About 130,000 people worked as psychologists in 1978. The largest group worked in educational institutions—primarily colleges and universities. Some were counselors; others were researchers, administrators, or teachers.

The second largest group of psychologists work in hospitals, clinics, rehabilitation centers, nursing homes, and other health facilities. Many others work for government agencies at the Federal, State, and local levels. The Veterans Administration, the Department of Defense, and the Public Health Service employ more psychologists than other Federal agencies. Psychologists also are employed by research organizations, management counsulting firms, market research firms, and businesses. Some are in practice for themselves or have their own research or consulting firms.

Training, Other Qualifications, and Advancement

A doctoral degree, the minimum required for employment as a psychologist, is increasingly important for advancement and tenure, particularly in the academic world. People with doctorates in psychology (Ph. D. or Psy. D.—Doctor of Psychology) qualify for a wide range of responsible research, clinical, and counseling positions in universities and the government.

People with a master's degree in psychology can administer and interpret tests as psychological assistants. Under the supervision of psychologists, they can conduct research in laboratories or perform administrative duties. They may teach in 2-year colleges, or work as school psychologists or counselors. (See the *Handbook* statements on school counselors and rehabilitation counselors.)

People with a bachelor's degree in psychology are qualified to assist psychologists and other professionals in community mental health centers, vocational rehabilitation offices, and correctional programs; to work as research or administrative assistants; to take jobs as trainees in government or business; or—provided they meet State certification requirements—to teach high school. However, without additional academic training, their advancement opportunities are limited.

In the Federal Government, candidates having at least 24 semester hours in psychology and one course in statistics qualify for entry level positions though competition is keen. Clinical psychologists generally must have completed the Ph. D. or Psy. D. requirements and have served an internship; counseling psychologists usually need 2 years of graduate study in counseling and 1 year of counseling experience.

At least 1 year of full-time graduate study is needed to earn a master's degree in psychology. Requirements usually include practical experience in an applied setting or a master's thesis based on a research project. Three to five years of graduate work usually are required for a doctoral degree. The Ph. D. degree culminates in a dissertation based on original research. The Psy. D., based on practical work and examinations rather than a dissertation, prepares students for clinical and other applied positions. In clinical or counseling psychology, the requirements for the Ph. D. degree generally include an additional year or more of internship or supervised experience.

Competition for admission into graduate programs is keen. Some universities require an undergraduate major in psychology. Others prefer only basic psychology with courses in the biological, physical, and social sciences, statistics, and mathematics.

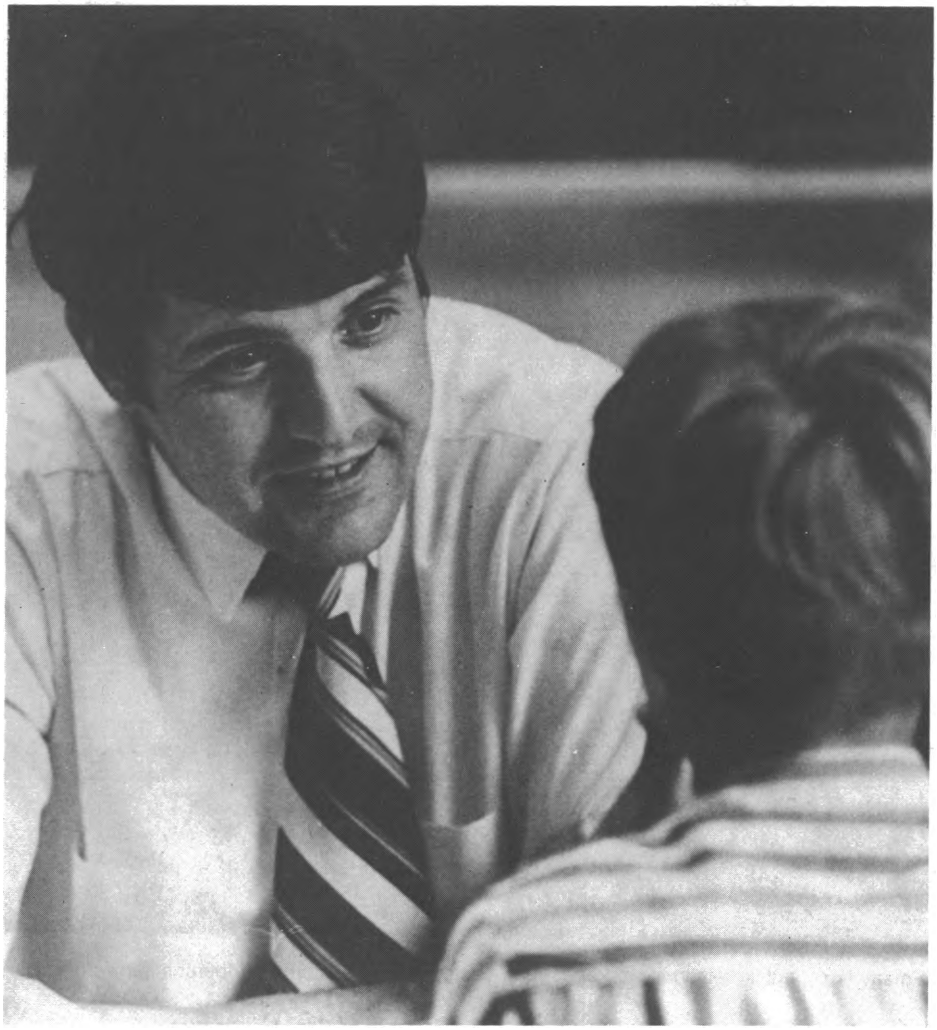
Over 1,500 colleges and universities offer a bachelor's degree program in psychology; about 325, a master's; about 165, a Ph. D.; and about 10, a Psy. D. In addition, a growing number of professional schools of psychology not affiliated with colleges or universities offer the Psy. D. The American Psychological Association (APA) presently accredits Ph. D. training programs in clinical, counseling, and school psychology as well as Psy. D. programs. In 1978, over 100 colleges and universities offered fully approved programs in clinical psychology; over 20, in counseling psychology; fewer than 10, in school psychology; and 2 Psy.D. programs. APA also has approved about 140 internship facilities for doctoral training in clinical and counseling psychology.

Because graduates face increasing competition, particularly for academic jobs, many take courses in law, medicine, business, marketing, public affairs, and other fields to enhance their qualifications for nonacademic careers.

Although financial aid is becoming increasingly difficult to obtain, some graduate students are awarded fellowships or scholarships, or arrange part-time employment. The Veterans Administration offers predoctoral traineeships to interns in VA hospitals, clinics, and related training agencies. The National Science Foundation, the Department of Health, and Human Services, the Armed Forces, and many other organizations also provide fellowships and loans. However, the present trend at the Federal level is to provide low-interest loans rather than fellowships and grants.

Psychologists who want to enter independent practice must meet certification or licensing requirements. In 1978, all States and the District of Columbia had such requirements. Licensing laws vary by State, but generally require a doctorate in psychology, 2 years of professional experience, and an examination. Some States certify those with master's level training as psychological assistants or associates. Some States require continuing education for relicensure.

The American Board of Professional Psychology awards diplomas in clinical, counseling, industrial and organizational, and school psychology. Candidates generally need a doctorate in psychology, 5 years' experience, professional endorsements, and must pass an examination.



Sensitivity, compassion, patience, and the ability to inspire others are vital for counseling psychologists.

People pursuing a career in psychology must be emotionally stable, mature, and able to deal effectively with people. Sensitivity, compassion, patience, and the ability to lead and inspire others are particularly important for clinical work and counseling. Research psychologists should be able to do detailed work independently and as part of a team. Verbal and writing skills are necessary to communicate research findings. Patience and perseverance are vital qualities because results from psychological treatment of patients or research often are long in coming.

Employment Outlook

Employment of psychologists is expected to grow faster than the average for all occupations through the 1980's. In addition to employment growth, some openings will result from deaths, retirements, and other separations from the labor force.

Several factors should help maintain a strong demand for psychologists: (1) Public concern for the development of human resources which may result in more services for minorities, the elderly, and the poor; (2) heightened awareness of the need for testing and counseling children; (3) Federal legislation emphasizing good health rather than treatment of illness; and (4) psychological services in a national health insurance program.

Some openings are likely to occur as psychologists move into the field of technology assessment—the study of the effects of technological advances in areas such as agriculture, energy, the environment, and the conservation and use of natural resources. Psychologists increasingly are involved in program evaluation in such fields as health, education, military service, law enforcement, and consumer protection.

A doctorate is necessary for those wishing to enter the field, but the degree does not guarantee a job. Through the 1980's, the number of doctoral degrees awarded each year will increase and heighten competition for jobs, particularly teaching and research. Nonacademic settings may offer the best prospects, but budgetary restraints in both the public and private sectors could limit expansion of psychological services and thus alter the job outlook.

Persons holding doctorates from leading universities in applied areas such as clinical, counseling, and industrial or organizational psychology will have more favorable prospects for nonacademic jobs than those trained in experimental, physiological, and comparative psychology. Some may accept jobs below their levels of aspiration. Graduates willing to work in smaller and newer academic institutions may have better employment prospects.

Earnings

According to the 1977-78 College Placement Council Salary Survey, bachelor's degree candidates in the social sciences received offers averaging around $10,700 a year; master's degree candidates in the social sciences, $13,200.

According to a 1977 survey by the National Research Council, the median annual salary of doctoral psychologists was about $23,800. In educational institutions, the median was about $22,300; in the Federal Government, about $30,300; in State and local government, about $23,000; in hospitals and clinics, about $23,000; in other nonprofit organizations, about $24,500; and in business and industry, about $33,800. Ph. D. or Psy. D. psychologists in private practice and in applied specialties generally have higher earnings than other psychologists.

The Federal Government recognizes education and experience in certifying applicants for entry level positions. In general, the entrance salary for psychologists having a bachelor's degree was $10,507 or $13,014 a year in 1979; counseling psychologists with a master's degree and 1 year of counseling experience could start at $15,920; clinical psychologists having a Ph. D. or Psy.D. degree and 1 year of internship could start at $19,263. The average salary for psychologists in the Federal Government was about $28,200 a year in 1978.

According to a 1978 State Salary Survey, average annual salaries of clinical psychologists (positions usually requiring a doctor's degree in clinical psychology plus completion of an approved internship or period of supervised experience) in State government range from about $17,300 to $22,900.

Related Occupations

Psychologists are trained to evaluate, counsel, and advise individuals and groups. Others who do this kind of work are psychiatrists, social workers, clergy, special education teachers, and counselors.

Sources of Additional Information

For information on careers, educational requirements, financial assistance, and job openings, contact:

American Psychological Association, Educational Affairs Office, 1200 17th St. NW., Washington, D.C. 20036.

Information on traineeships and fellowships also is available from colleges and universities that have graduate departments of psychology.

Public Relations Workers

(D.O.T. 165.067-010)

Nature of the Work

How successfully an organization presents its goals and policies to the public may affect its acceptance, prosperity, and even its continued existence. Public relations workers help businesses, government, universities, and other organizations build and maintain a positive public image. In improving communication, they aid understanding and cooperation among the diverse groups that make up our society.

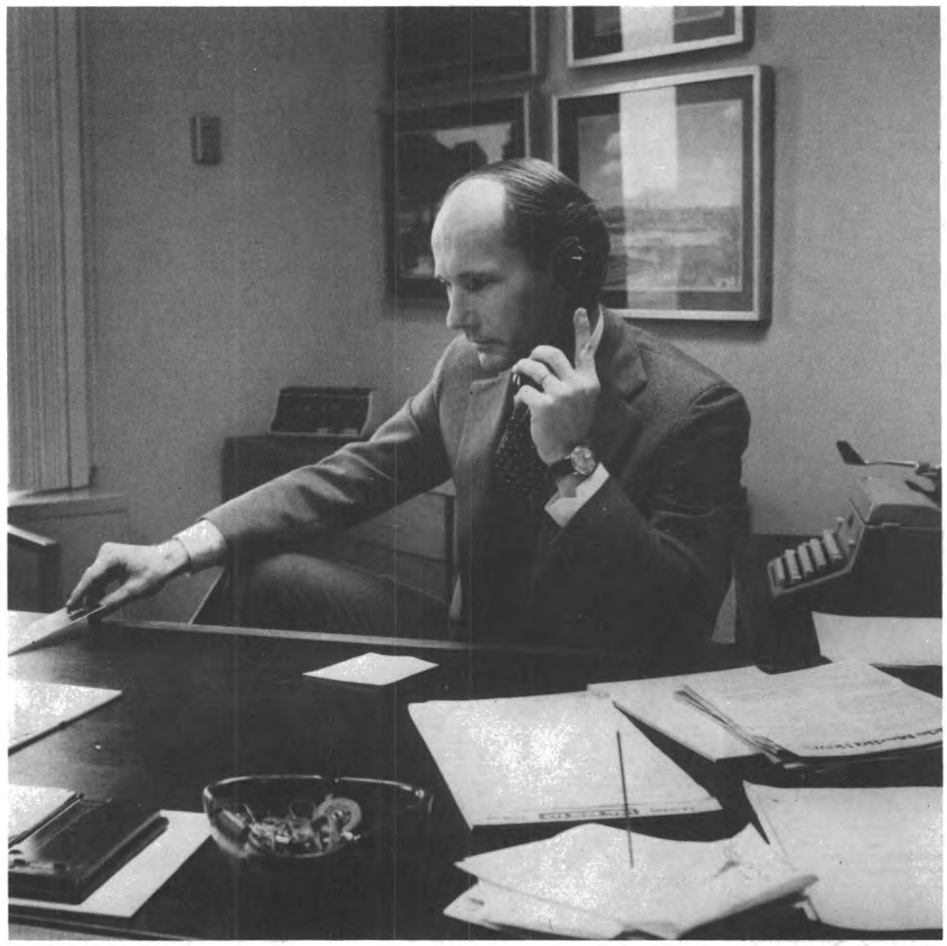
Public relations workers apply their talents and skills in many different areas. They may handle press, community, or consumer relations, political campaigning, interest-group representation, fundraising, or employee recruitment. Public relations is more than "telling the employer's story," however. Understanding the attitudes and concerns of customers, employees, and various other "publics"—and communicating this information to management to help formulate policy—is an important part of the job.

Public relations departments are found in a variety of organizations, and workers must tailor their programs to an employer's particular needs. A public relations director of a college or university, for example, may spend most of the time recruiting students, while one in a large corporation may work with stockholders, government agencies, and community groups.

Public relations workers put together information that keeps the public aware of their employer's policies, activities, and accomplishments, and keeps management aware of public attitudes. After preparing the information, they may contact people in the media who might be interested in publicizing their material. Many radio or television announcements, special reports, newspaper items, and magazine articles start at public relations workers' desks. Sometimes the subject is a company and its policies towards its employees or its role in the community. Often the subject is a public issue, such as health, nutrition, energy, or the environment.

Public relations workers also arrange and conduct programs in which company representatives will have direct contact with the public. Such work includes setting up speaking engagements and helping prepare speeches for company officials. These workers often represent employers at community projects or occasionally may show films at school assemblies, plan conventions, or manage fundraising campaigns.

Public relations staffs in very large firms may number 200 or more, but in most firms the staff is much smaller. The director of public relations, who is often a vice president of the company, may develop overall plans and policies with a top management executive. In addition, large public relations departments employ writers, research workers, and other specialists who prepare material for the different media, stockholders, and other groups the company wishes to reach.



In many firms, public relations workers set up speaking engagements for the company's officials.

Workers who handle publicity for an individual or direct public relations for a university or small business may handle all aspects of the job. They contact people outside the organization, do the necessary planning and research, and prepare material for publication. These workers may combine public relations duties with advertising or sales promotion work; they may be top-level officials or in more junior positions. The most skilled public relations work of making overall plans and maintaining contacts usually is done by the department director and highly experienced staff members.

Working Conditions

Although the workweek for public relations staffs generally is 35 to 40 hours, schedules may be rearranged because public relations programs operate against deadlines. Preparing and delivering speeches, attending meetings and community activities, and out of town travel may all be a part of the public relations worker's routine. Thus, any of their regular assignments or special events may require workers to be at the job or on call around the clock.

Places of Employment

About 131,000 persons were public relations workers in 1978. Manufacturing firms, public utilities and transportation companies, insurance companies, and trade and professional associations employ many public relations workers. A sizable number work for government agencies (the Federal Government alone employs several thousand public information specialists), or for schools, colleges, museums, and other educational, religious, and human service organizations. The rapidly expanding health field also offers opportunities for public relations work, in hospitals, pharmaceutical companies, and medical associations, for example. A number of workers are employed by public relations consulting firms which furnish services to clients for a fee. Some work for advertising agencies.

Public relations workers are concentrated in large cities where press services and other communications facilities are readily available, and where many businesses and trade associations have their headquarters. More than half of the estimated 2,000 public relations consulting firms in the United States are in New York, Los Angeles, Chicago, and Washington, D.C. A major trend however, is the dispersal of public relations jobs throughout the Nation, including smaller towns.

Training, Other Qualifications, and Advancement

A college education combined with public relations experience is excellent preparation for public relations work. Although most beginners have a college degree in journalism, communications, or public relations, some employers prefer a background in a field related to the firm's business—science, finance, or engineering, for example. Some firms want college graduates who have worked for the news media. In fact, many editors, reporters, and workers in closely related fields enter public relations work.

In 1978, about 90 colleges and more than 30 graduate schools offered degree programs or special curriculums in public relations, usually administered by the journalism or communications department. In addition, about 200 colleges offered at least one course in this field. Courses in advertising, journalism, business administration, political science, communications, psychology, and creative writing help in preparing for a career in public relations. In addition, some colleges offered courses such as public relations theory and techniques, organizational communication, public relations management and administration, and practical courses in public relations. Specialties are offered in public relations in business, government, and nonprofit organizations. Persons who have a bachelor's degree in public relations or a related field generally enter staff positions whereas those with a graduate degree are more qualified for administrative and managerial jobs.

Public relations workers must be able to gather information, write, speak, and deal effectively with people. Extracurricular activities such as writing for a school publication or television or radio station provide valuable experience. Many schools help students gain part-time or summer internships in public relations which provide training that can help in competing for entry positions. Membership in the Public Relations Student Society of America provides an opportunity for students to exchange views with public relations workers and to make professional contacts that may be helpful later in securing a job in the field. A portfolio of published articles, television or radio programs, slide presentations, and other work samples usually is an asset in finding a job.

Creativity, initiative, and the ability to express thoughts clearly and simply are important to the public relations worker. Fresh ideas are so vital in public relations that some experts spend all their time developing new ideas.

People who choose public relations as a career need an outgoing personality, self-confidence, and an understanding of human psychology. They should have the enthusiasm to motivate people. The ability to be competitive but function as part of a team are important qualifications.

Public information positions in the Federal Government generally require a college degree. Media, writing, or editing experience may help in gaining such a position. Requirements for similar positions in State and local governments vary.

Some companies—particularly those with large public relations staffs—have formal training programs for new workers. In other firms, new employees work under the guidance of experienced staff members. Beginners often maintain files of material about company activities, scan newspapers and magazines for appropriate articles to clip, and assemble information for speeches and pamphlets. After gaining experience, they work on more difficult assignments, such as writing press releases, speeches, and articles for publication. In some firms, workers get all-round experience whereas in other firms they specialize.

Promotion to supervisory jobs may come as workers show they can handle more demanding and creative assignments. Some experienced public relations workers start their own consulting firms.

The Public Relations Society of America accredits public relations workers who have at least 5 years' experience in the field and have passed a comprehensive 6-hour examination (4 hours written, 2 hours oral). However, because of disagreements over the appropriateness of formal licensing requirements in this field, such requirements for employment are not expected in the immediate future.

Employment Outlook

Employment of public relations workers is expected to increase faster than the average for all occupations through the 1980's. In addition to new jobs resulting from growth in the demand for these workers, openings will occur each year as workers die, retire, or leave the field for other reasons.

Demand for public relations workers may slacken as employers delay expansion or cut their staff during business slowdowns, but over the long run, corporations, associations, and other large organizations are expected to expand their public relations staffs.

Competition for beginning jobs is keen, for the glamour and excitement of public relations attracts large numbers of jobseekers, including transfers from newspaper, advertising, and closely related jobs.

Prospects for a career in public relations are best for highly qualified applicants—talented people with sound academic preparation and some media experience. Most openings are expected to occur in large organizations—corporations, public relations consulting firms, manufacturing firms, educational institutions, and others.

Earnings

Starting salaries for college graduates beginning in public relations work generally ranged from $9,600 to $13,800 a year in 1978; persons with a graduate degree generally started at a higher salary.

The salaries of experienced workers generally are highest in large organizations with extensive public relations programs. According to a 1978 survey, median annual salaries of public relations workers were as follows: Presidents of public relations consulting firms, $36,000; public information or relations directors and managers in the Federal Government, $31,200, in State government, $24,000, in local government, $22,700, and in educational organizations, $25,000.

Public relations consulting firms often pay higher salaries than organizations with their own public relations departments. Many firms offer incentive compensation. Salaries in manufacturing firms are among the highest while salaries in social welfare agencies, nonprofit organizations, hospitals, and universities are among the lowest.

In the Federal Government, bachelor's degree holders generally started at $10,000 a year in 1978, master's degree holders generally started at $15,300 a year; additional education or experience could qualify applicants for a higher salary. Public information specialists averaged about $26,150 a year in 1978.

Related Occupations

Public relations workers develop and distribute persuasive material in order to create a favorable public reputation. Other workers with similar jobs include fundraisers, account executives, lobbyists, promotion managers, goodwill ambassadors, advertising managers, and police officers involved in community relations.

Sources of Additional Information

For career information and a list of schools offering degrees and courses in the field, write to:

Career Information, Public Relations Society of America, Inc., 845 Third Ave., New York, N.Y. 10022.

Current information on the public relations field, salaries, and other items is available from:

PR Reporter, Dudley House, P.O. Box 600, Exeter, N.H. 03833.

For additional information on job opportunities and the public relations field in general, write to:

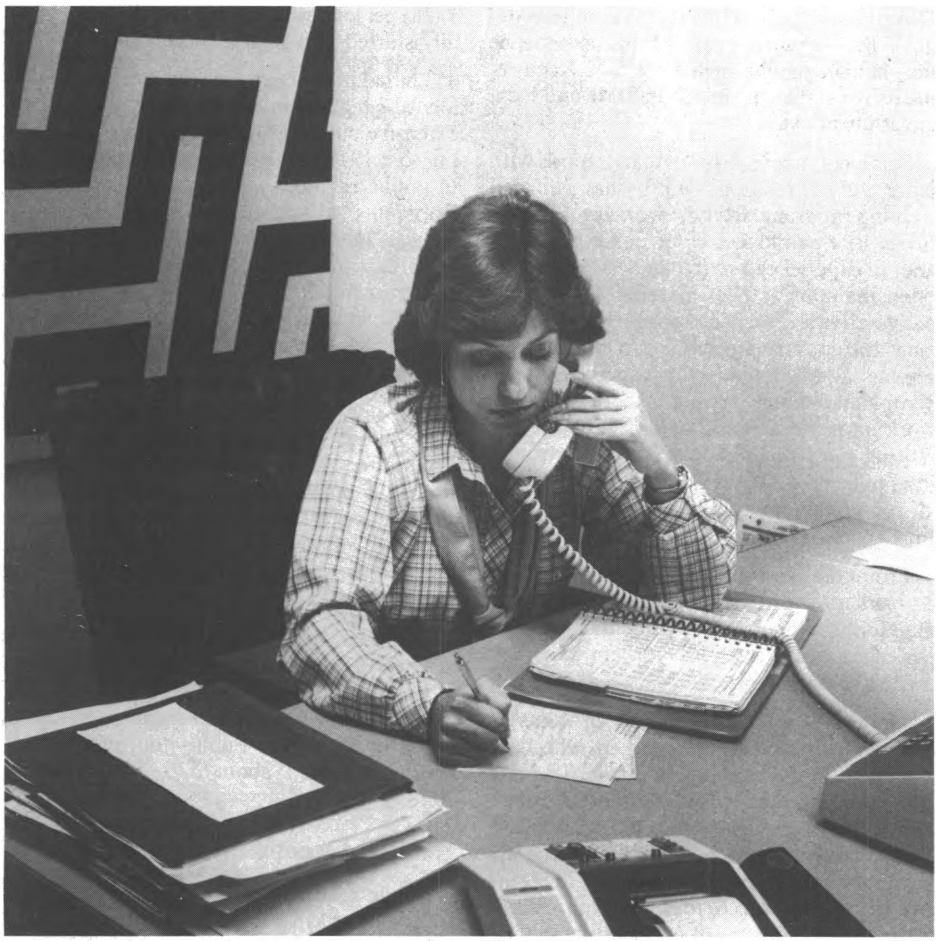
Service Department, *Public Relations News*, 127 East 80th St., New York, N.Y. 10021.

Purchasing Agents

(D.O.T. 162.157-038)

Nature of the Work

If materials, supplies, or equipment are not on hand when they are needed, the entire production process or work flow in an orga-



Because purchasing agents can buy from many sources, their main job is to choose the supplier who offers the best value.

nization could be interrupted or halted. Maintaining an adequate supply of necessary items is the purchasing agent's responsibility. This includes more than just buying goods and services, however. Market forecasting, production planning, and inventory control all are a part of the job.

Purchasing agents, also called industrial buyers, obtain goods and services of the quality required at the lowest possible cost, and see that adequate supplies always are available. Agents who work for manufacturing firms buy machinery, raw materials, product components, services, and maintenance and repair supplies; those working for government agencies purchase office supplies, furniture, business machines, and vehicles. Information on retail buyers, who purchase merchandise for resale in its original form, is presented in the chapter on buyers elsewhere in the *Handbook*.

Purchasing agents buy supplies when the stocks on hand reach a predetermined reorder point, or when a department in the organization requisitions items it needs. Because agents often can purchase from many sources, their main job is selecting the seller who offers the best value.

Purchasing agents use a variety of means to select among suppliers. They compare listings in catalogs and trade journals and telephone suppliers to get information. They also meet with salespersons to examine samples, attend demonstrations of equipment, and discuss items to be purchased. Frequently, agents invite suppliers to bid on large orders, and then select the lowest bidder among those who meet the organization's requirements for quality of goods and delivery date. New products are researched through trade journals, catalogs, and discussions with suppliers.

Sometimes purchasing agents must deal directly with a manufacturer to obtain specially designed items made exclusively for their organization. To insure that all product specifications are met, agents must have a thorough understanding of the particular product and its applications. In some cases, such as when buying computer equipment, this means agents must have considerable technical knowledge.

It is important that purchasing agents develop a good business relationship with their suppliers as this can result in cost savings, favorable payment terms, and quick delivery on emergency orders or help in obtaining materials in short supply. Agents also work closely with other employees in various departments of their own organization. For example, they may discuss product design with company engineers or shipment problems with workers in the traffic department.

Once an order has been placed with a supplier, the purchasing agent checks periodically to insure prompt delivery. When an order arrives, it is inspected before the purchasing agent authorizes payment to the supplier.

Because of its importance, purchasing usually is designated as a separate responsibility within an organization. In a large firm or government agency, purchasing agents usually specialize in one or more specific commodities or groups of commodities—for example, steel, lumber, cotton, or petroleum products. Agents are divided into sections, headed by assistant purchasing managers, that are responsible for a group of related commodities. In smaller organizations, agents generally are assigned certain categories of goods, such as all raw materials or all office supplies, furniture, and business machines.

Working Conditions

Purchasing agents generally work a standard 35 to 40 hour week. Some overtime may be necessary, for example, if the supply of materials or equipment needed to maintain the production schedule runs short. Although they spend most of their time in the office, some travel usually is required to attend educational seminars and sales conventions, or to visit suppliers.

Places of Employment

About 185,000 persons worked as purchasing agents in 1978. Over half worked in manufacturing industries. Large numbers also were employed by government agencies, construction companies, hospitals, and schools.

About half of all purchasing agents work in organizations that have fewer than five employees in the purchasing department. Many large business firms and government agencies, however, have much larger purchasing departments; some employ as many as 100 specialized buyers or more.

Training, Other Qualifications, and Advancement

Although there are no universal educational requirements for entry level jobs, most large organizations now require a college degree, and prefer applicants who have a master's degree in business administration or management. Training requirements vary with the needs of the firm. For example, companies that manufacture complex machinery or chemicals may prefer applicants whose backgrounds are in engineering or science, while other companies hire persons who have majored in business administration or a technical discipline for trainee jobs. Courses in purchasing, accounting, economics, and statistics are very helpful. Familiarity with the computer and its uses also is desirable in understanding the systems aspects of the purchasing job.

Small companies generally have less rigid

educational requirements because they often purchase less complex goods and order much smaller quantities. Some require a bachelor's degree; many others, however, hire graduates of associate degree programs in purchasing for entry level jobs. Also, small organizations more frequently promote clerical workers or technicians into purchasing jobs. Regardless of the size of an organization, however, a college degree is becoming increasingly important for advancement to management positions.

Whatever their educational background, beginning purchasing agents spend considerable time learning about company operations and purchasing procedures. They may be assigned to the production planning section to learn about the purchasing system, inventory records, and storage facilities. They work with experienced buyers to learn about commodities purchased, prices, suppliers used, and negotiating techniques.

Following the initial training period, junior purchasing agents usually are given the responsibility for purchasing standard and catalog items. As they gain experience and develop expertise in their assigned areas, they may be promoted to purchasing agent, then senior purchasing agent.

Purchasing agents must be able to analyze the technical data in suppliers' proposals in order to make buying decisions and spend large amounts of money responsibly. The job requires the ability to work independently and a good memory for details. In addition, a purchasing agent must be able to get along well with people in order to balance the needs of personnel in his or her organization with budgetary constraints, and negotiate with suppliers.

Workers with proven ability can move into a job as assistant purchasing manager in charge of a group of purchasing agents and then advance to manager of the entire purchasing department. Many purchasing managers move into executive positions as director of purchasing or director of materials management.

Continuing education is essential for purchasing agents who want to advance in their careers. Purchasing agents are encouraged to participate in frequent seminars offered by professional societies and to take courses in purchasing at local colleges and universities. The recognized mark of experience and professional competence in private industry is the designation Certified Purchasing Manager (CPM). This designation is conferred by the National Association of Purchasing Management, Inc., upon candidates who have passed four examinations and who meet educational and experience requirements. In government agencies, the indications of professional competence are the designations Professional Public Buyer (PPB) and Certified Public Purchasing Officer (CPPO), which are conferred by the National Institute of Governmental Purchasing, Inc. The PPB is earned by passing two written examinations and meeting certain educational and experience requirements. A candidate must have met a more stringent set of basic requirements, pass two different written exams, and pass an oral exam as well in order to earn the CPPO.

Employment Outlook

Employment of purchasing agents is expected to increase faster than the average for all occupations through the 1980's. Several thousand jobs will be open each year as demand for purchasing agents increases and as workers die, retire, or transfer to other work.

Demand for purchasing agents is expected to rise as their importance in reducing costs is increasingly recognized. In large industrial organizations, the purchasing department will be expanded in order to handle the growing complexity of manufacturing processes. Companies that manufacture complex items such as industrial engines and turbines, electronic computer equipment, and communications equipment, there will be a growing need for persons with a technical background to select highly technical goods.

Many opportunities also should arise in firms providing personal, business, and professional services. Strong growth is expected for this sector of the economy, as a growing number of hospitals, school districts, and other relatively small employers are recognizing the importance of professional purchasers in reducing their operating costs.

Opportunities will be excellent for persons who have a master's degree in business administration. Persons with a bachelor's degree in engineering, science, or business administration whose college program included one course or more in purchasing also should have bright prospects. Graduates of 2-year programs in purchasing should continue to find ample opportunities, although they will probably be limited to small firms.

Earnings and Working Conditions

College graduates hired as junior purchasing agents in large firms earned about $12,900 a year in 1978, according to surveys conducted by the Bureau of Labor Statistics. Experienced agents purchasing standard items averaged about $16,200 a year; senior purchasing agents specializing in complex or technical goods averaged about $19,600. Assistant purchasing managers received average salaries of about $23,900 a year, while managers of purchasing departments received about $29,500. Many corporate directors of purchasing or materials management earned well over $50,000 a year. Salaries generally are higher in large firms where responsibilities often are greater. In 1978, purchasing agents earned almost twice as much as the average for all nonsupervisory workers in private industry, except farming.

In the Federal Government, beginning purchasing agents who had college degrees earned $10,096 or $12,505 in 1978, depending on scholastic achievement and relevant work experience. The average salary for all purchasing agents in the Federal Service was $22,239. Salary levels vary widely among State governments; average earnings range from $11,549 to $15,235 for purchasers of standard items, from $15,856 to $21,028 for senior buyers purchasing highly complex items, and from $23,293 to $29,781 for State purchasing directors.

Related Occupations

Other workers who negotiate and contract to purchase equipment, supplies, or other merchandise include retail buyers, purchase-price analysts, grain buyers, procurement services managers, livestock commission agents, traffic managers, and wholesalers.

Sources of Additional Information

Further information about a career in purchasing is available from:

National Association of Purchasing Management, Inc., 11 Park Place, New York, N.Y. 10007.

National Institute of Governmental Purchasing, Inc., 1001 Connecticut Ave. NW., Suite 922, Washington, D.C. 20036.

Radio and Television Announcers

(D.O.T 159.147)

Nature of the Work

Most radio announcers act as disc jockeys, introducing recorded music, presenting news and commercials, and commenting on other matters of interest to the audience. They may "ad-lib" much of the commentary, working without a detailed script. They also may operate the control board, sell time for commercials, and write commercial and news copy. In large stations, however, other workers handle these jobs.

Announcers employed by television stations and large radio stations usually specialize in particular kinds of announcing such as sports, news, or weather. They must be thoroughly familiar with their particular area. If a written script is needed for parts of the program, the announcer may do the research and writing. Announcers frequently participate in community activities. A sportscaster, for example, might be the master of ceremonies at a touchdown club banquet or greet customers at the opening of a new sporting goods store. Some announcers become well-known and highly paid personalities.

Working Conditions

Announcers generally work in well-lighted, air-conditioned, soundproof studios. When working outside the studio, however, they may be subject to noise, crowds, and other unpleasant working conditions.

Maintaining a program schedule requires split second timing and can be physically

The glamour of the occupation attract many aspiring announcers.

and mentally demanding. Those who enjoy the work, however, feel that the intangible rewards—the many personal contacts and the satisfaction from becoming well known in the area their station serves—far outweigh the disadvantages of irregular hours, work pressures, and disrupted personal lives.

Places of Employment

About 27,000 announcers were employed by radio and television broadcasting stations in 1978. In addition to staff announcers, many freelance announcers sell their services for individual assignments to networks and stations, or to advertising agencies and other independent producers.

Training, Other Qualifications, and Advancement

Entry to this highly competitive profession is very difficult. While formal training in a college or technical school is valuable, station officials pay particular attention to taped auditions that contain samples of an applicant's style on commercials, news, interviews, and music copy. Some inexperienced persons accept clerical, routine technical, and other nonannouncing jobs with the hope of being assigned announcing duties after gaining on-the-job experience.

Announcers must have a pleasant and well-controlled voice, a good sense of timing, and excellent pronunciation. Correct English usage and a knowledge of dramatics, sports, music, and current events improve chances for success. Good judgment and the ability to react quickly in emergencies are important since announcers may be required to "ad-lib" all or part of a show. A neat, pleasing appearance is essential, of course, for television announcers. The most successful announcers have a combination of personality and a knack for dramatization that makes them attractive to audiences.

High school courses in English, public speaking, dramatics, foreign languages, and electronics, plus sports and music hobbies, are valuable background for prospective announcers. A college liberal arts education provides an excellent background for an announcer, and many universities offer courses of study in the broadcasting field. Students at these institutions also may gain valuable experience by supplementing their courses with part-time work at the campus radio station and summer work at local stations, filling in for vacationing staff members. A number of private broadcasting schools offer training in announcing.

Persons considering enrolling in any school, whether public or private, that offers training for a broadcasting career should contact the personnel managers of stations, broadcasting trade organizations, and the Better Business Bureau in their area to determine the school's performance in producing suitably trained candidates.

Announcers generally get their first broadcasting jobs in small stations. Because announcers in small radio stations sometimes operate transmitters, prospective announcers often obtain an FCC (Federal Communications Commission) restricted radiotelephone operator permit. This qualifies them to become involved in the routine operation of radio transmitters and makes them much more useful to these stations. Of course, employers may be even more attracted to those who have a first class radiotelephone operator license. (For additional information on licensure, see the *Handbook* statement on broadcast technicians.)

Announcers usually work in several different stations in the course of their careers. After acquiring experience at a station in a small community, an ambitious and talented announcer may move to a better paying job in a large city. An announcer also may advance by getting a regular program as a disc jockey, sportscaster, or other specialist. In the national networks, competition for jobs is particularly intense, and announcers often must be college graduates and have several years of successful announcing experience before they are given an audition.

Employment Outlook

Competition for beginning jobs as announcers will be very keen through the 1980's. The great attraction of the broadcasting field will continue to mean many more jobseekers than jobs. It will be easier to get jobs in radio than in television because more radio stations hire beginners. These jobs generally will be located in small stations, and the pay will be relatively low. Stations in major metropolitan areas seek highly experienced announcers in this extremely competitive industry.

Employment of announcers is expected to increase about as fast as the average for all occupations through the 1980's as new radio and television stations are licensed. Some jobs will become available as more cable television stations begin their own programming. Employment of announcers is not expected to keep pace with the increase in the number of stations, however, because of the increased use of automatic programming equipment. Some jobs in this relatively small occupation will result from the need to replace experienced announcers who transfer to other occupations, retire, or die.

Earnings

In 1978, announcers generally started at $150 to $160 a week in small stations, according to the limited information available. Earnings among experienced announcers were much higher, and some well-known announcers in major metropolitan areas earned extremely high salaries. As a rule, salaries increase with the size of the community and the station, and salaries in television are higher than those in radio. Announcers employed by educational broadcasting stations generally earn less than those who work for commercial stations.

Most announcers in large stations work a 40-hour week and receive overtime pay for additional hours. Many announcers in small stations work a considerable amount of overtime. Working hours consist of both time on the air and time spent in preparing for broadcasts. Evening, night, weekend, and holiday duty occurs frequently since many stations broadcast 24 hours a day, 7 days a week.

Related Occupations

The success of radio and television announcers is largely dependent upon their

ability to speak effectively to their audiences. Others for whom oral communications skills are vital are interpreters, narrators, actors, comedians, and impersonators.

Sources of Additional Information

For general career information, write to:

National Association of Broadcasters, 1771 N St. NW., Washington, D.C. 20036.

For a list of schools that offer programs and courses in broadcasting, contact:

Broadcast Education Association, National Association of Broadcasters, 1771 N St. NW., Washington, D.C. 20036.

For information on FCC licensure, write to:

Federal Communications Commission, Policy Analysis Branch, 1919 M St. NW., Washington, D.C. 20554.

Range Managers

(D.O.T. 040.061-046)

Nature of Work

Rangelands cover more than 1 billion acres of the United States, mostly in the Western States and Alaska. They contain many natural resources: Grass and shrubs for animal grazing, habitats for livestock and wildlife, water from vast watersheds, facilities for water sports and other kinds of recreation, and valuable mineral and energy resources. Rangelands also serve as areas for scientific study of the environment.

Range managers, sometimes called *range scientists, range ecologists*, or *range conservationists*, manage, improve, and protect range resources to maximize their use without damaging the environment. For example, range managers help ranchers optimize livestock production by determining the number and kind of animals to graze, the grazing system to use, and the best season for grazing. At the same time, however, they conserve the soil and vegetation for other uses such as wildlife habitat, outdoor recreation, and timber. While in the field, they may evaluate the water supply and types of vegetation available, take soil samples, and estimate the number of deer or other wildlife on the land.

Range managers restore and improve rangelands through controlled burning, reseeding, and biological, chemical, or mechanical control of undesirable plants. For example, some rangelands that have been invaded by sagebrush or other shrubs may be plowed and reseeded with more desirable plants. Range managers also determine the need for and carry out range conservation and development plans that provide water for grazing animals, erosion control, and fire prevention.

Not all of a range manager's time is spent outdoors. Office work is not unusual. The range manager may consult with other conservation specialists, prepare written reports, and do administrative work.

Because of the multiple use of rangelands, range managers often work in closely related fields such as wildlife and watershed management, forest management, and recreation.

Working Conditions

Range managers usually begin their careers on the range. They often spend considerable time away from home and work outdoors in all kinds of weather. Employers generally supply small planes, cars, or, in rough country, four-wheel vehicles or horses for range managers to use to get around. Occasionally they may walk.

There is much more to the job than simply riding the range, however. Range managers must constantly deal with other people, including the public, ranchers, government agencies, and persons who specialize in other areas of conservation. In some cases, they may work as part of a team.

Many range managers advance to administrative jobs where they write reports, attend meetings or supervise the clerical staff.

Places of Employment

About 3,500 persons worked as range managers in 1978. The majority worked for the Federal Government, principally for the Forest Service and the Soil Conservation Service of the Department of Agriculture, and the Bureau of Indian Affairs and the Bureau of Land Management of the Department of the Interior. Range managers in State governments are employed in game and fish departments, State land agencies, and extension services.

An increasing number of range managers work for private industry. Coal and oil companies employ range managers to help restore, or reclaim mined areas. Banks and real estate firms employ them to help increase the revenue from their landholdings. Other range managers work for private consulting firms and large ranches.

Some range managers who have advanced degrees teach and do research at colleges and universities. Other range managers work overseas with United States and United Nations agencies and with foreign governments. Many foreign countries, however, are now beginning to train their own citizens in range management.

Training, Other Qualifications, and Advancement

A bachelor's degree with a major in range management or range science is the usual minimum educational requirement for range managers. In the Federal Government, a degree in a closely related field, such as agronomy or forestry, including courses in range management and range science, also may be accepted. Inasmuch as Federal agencies may upgrade their requirements and hire only range management graduates, a degree in range management is strongly recommended for persons who want to enter this field. Graduate degrees in range management generally are required for teaching and research positions, and may be helpful for advancement in other jobs.

In 1978, about 20 colleges and universities offered degree programs in range management or range science. A number of other schools offered course work in range management.

A degree in range management requires a basic knowledge of biology, chemistry, physics, mathematics, and communication skills. Specialized courses combine plant,

Range managers spend much of their time working outdoors, often in remote areas.

animal, and soil sciences with principles of ecology and resource management. Desirable electives include economics, computer science, forestry, hydrology, wildlife, and recreation.

Federal agencies, primarily the Forest Service, the Soil Conservation Service, and the Bureau of Land Managment, hire college students for summer jobs in range management. This experience may better qualify these students for jobs when they graduate.

Besides having a love for the outdoors, range managers must be able to write and speak effectively and work well with others. They should be able to work either alone or under direct supervision. Good physical health and stamina also are important for range work.

Employment Outlook

Employment of range managers is expected to grow faster than the average for all occupations through the 1980's. Job opportunities throughout this period are expected to be good for persons who have degrees in range management or range science. Also, a few jobs may be filled by persons with degrees in related fields who have had some range management courses.

The growing demand for red meat, wildlife habitat, recreation, and water, as well as increasing environmental concern should stimulate the need for more range managers. Since the amount of land cannot be expanded, range managers will need to increase productivity while they maintain the environmental quality of the range ecosystem. Also, range managers will be in greater demand to manage large ranches, which are increasing in number.

As oil and coal exploration accelerates, private industry will require many more range specialists to reclaim or restore mine lands to a productive state.

The use of rangelands for other purposes such as wildlife habitat and recreation could create additional need for range managers. Federal hiring for these activities depends heavily upon legislation concerning the management of range resources, as well as budgetary limitations, personnel ceilings and program priorities.

Earnings

In the Federal Government, range managers with a bachelor's degree started at either $10,507 or $13,014 a year in early 1979 depending on their college grades. Those having 1 or 2 years of graduate work began at $13,014 or $15,920; persons with Ph. D. degrees started at either $15,920 or $19,263. Range managers with the Federal Government averaged about $20,000 a year in 1978.

Salaries for range managers who work for State governments and private companies are about the same as those paid by the Federal Government, according to limited data.

Related Occupations

Range managers are not the only workers who plan and manage the use of our natural resources. Other workers with similar duties include animal breeders, farmers, farm managers, foresters, ranchers, fish hatchery managers, wildlife managers, and soil conservationists.

Sources of Additional Information

Information about a career as a range manager as well as a list of schools offering training is available from:

Society for Range Management, 2760 W. 5th Ave., Denver, Col. 80204.

For information about career opportunities in the Federal Government, contact:

Bureau of Land Management, Denver Service Center, Federal Center Building 50, Denver, Colo. 80255.

Forest Service, U.S. Department of Agriculture, Washington, D.C. 20250.

Soil Conservation Service, U.S. Department of Agriculture, Washington, D.C. 20250.

Real Estate Agents and Brokers

(D.O.T. 186.117-058; 250.157-010, .357-014 and -018)

Nature of the Work

Housing, whether a home or an apartment, is the single most expensive item in most people's budgets. Thus, people generally seek the help of a real estate agent or broker when buying, or selling, a home. These workers have a thorough knowledge of the housing market in their community. They know which neighborhoods will best fit their clients' lifestyles and budgets, local zoning and tax laws, and where to obtain financing for the purchase. They also act as a medium for price negotiations between buyer and seller, and help to ensure that the final price is fair to both.

Brokers are independent business people who not only sell real estate, but also rent and manage properties, make appraisals, and develop new building projects. In closing sales, brokers usually arrange for loans to finance the purchases, for title searches, and for meetings between buyers and sellers when details of the transactions are agreed upon and the new owners take possession. Brokers also manage their own offices, advertise properties, and handle other business matters. Some combine other types of work, such as selling insurance or practicing law, with their real estate business.

Real estate agents generally are independent sales workers who contract their services with a licensed broker. Today, relatively few agents work as employees of a broker or realty firm.

In selling or renting real estate, agents generally first meet with potential buyers to get a feeling for the type of home they would like, and can afford. Then, they may take the client to see a number of homes that appear to meet the needs and income of the client. Because real estate is so expensive, agents may have to meet several times with a prospective buyer to discuss properties. In answering questions, agents emphasize those selling points that are likely to be most important to the buyer. To a young family looking at a house, for example, they may point out the convenient fl or plan and the fact that schools and shopping centers are close by. Whenever bargaining over price becomes necessary, agents carefully follow the seller's instructions and may present counteroffers, in order to get the best possible price. In the closing stages of the sale, agents often arrange for a loan, title search, and the final meeting at which the buyer takes possession of the property.

There is more to the agents' job, however, than just selling. They also must have properties to sell. For this reason, agents spend much of their time obtaining "listings" (owner agreements to place properties for sale with the firm). Because obtaining listings is so important, agents may spend much time on the telephone exploring leads gathered from advertisements and personal contacts. When listing property for sale, agents make comparisons with similar property being sold to determine its fair market value.

Most real estate agents and brokers sell residential property. A few, usually in large firms, specialize in commercial, industrial, or other types of real estate. Each specialty requires knowledge of that particular type of property and clientele. Selling or leasing business property, for example, requires an understanding of leasing practices, business trends, and location needs. Agents who sell or lease industrial properties must know about transportation, utilities, and labor supply. To sell residential properties, the agent must know the location of schools, churches, shopping facilities, and public transportation, and be familiar with tax rates and insurance coverages.

Working Conditions

Although real estate agents and brokers generally base their operations in offices, most of their time is spent outside the office —showing properties to clients, evaluating properties for sale, meeting with prospective clients, and performing a wide range of other duties. Brokers provide office space, but agents generally furnish their own automobiles.

Agents and brokers often work long hours —more than 40 a week. In addition, they often work evenings and weekends to suit the convenience of their clients.

Places of Employment

About 555,000 persons sold real estate full time in 1978; many others sold on a part-time

basis. The number of people licensed to sell totaled almost 2 million in 1978, according to the National Association of Real Estate License Law Officials.

Most real estate firms are relatively small; indeed, some brokers operate a one-person business. Some large firms have several hundred real estate agents operating out of many branch offices. Most sales workers, however, work in firms with no more than 5 to 10 other agents. A growing number of brokers, currently about 1 in 5, have entered into franchise agreements with national or regional real estate organizations. Under this type of arrangement, similar to many fast-food restaurant operations, the broker pays a fee in exchange for the privilege of using the more widely known name of the parent organization. Although franchised brokers often receive help in training salespeople and in running their offices, they bear the ultimate responsibility for the success or failure of the firm.

Real estate is sold in all areas, but employment is concentrated in large urban areas and in smaller but rapidly growing communities.

Training, Other Qualifications, and Advancement

Real estate agents and brokers must be licensed in every State and in the District of Columbia. All States require prospective agents to be a high school graduate, be at least 18 years old, and pass a written test. The examination—more comprehensive for brokers than for agents—includes questions on basic real estate transactions and on laws affecting the sale of property. Most States require candidates for the general sales license to complete 30 hours of classroom instruction and those seeking the broker's license to complete 90 hours of formal training in addition to a specified amount of experience in selling real estate (generally 1 to 3 years). Some States waive the experience requirements for the broker's license for applicants who have a bachelor's degree in real estate. State licenses usually can be renewed annually without reexamination.

As real estate transactions have become more complex, many of the large firms have turned to college graduates to fill sales positions. A large number of agents have some college training, and the number of college graduates selling real estate has risen substantially in recent years. However, personality traits are fully as important as academic background. Brokers look for applicants who possess such characteristics as a pleasant personality, honesty, and a neat appearance. Maturity, tact, and enthusiasm for the job are required in order to motivate prospective customers in this keenly competitive field. Agents also should have a good memory for names and faces and business details, such as taxes, zoning regulations, and local land-use laws.

Young men and women interested in beginning jobs as real estate agents often apply in their own communities, where their knowledge of local neighborhoods is an advantage. The beginner usually learns the practical aspects of the job under the direction of an experienced agent.

Many firms offer formal training programs for both beginners and experienced agents. About 360 universities, colleges, and junior colleges offer courses in real estate. At some, a student can earn an associate's or bachelor's degree with a major in real estate; several offer advanced degrees. Many local real estate boards that are members of the National Association of Realtors sponsor courses covering the fundamentals and legal aspects of the field. Advanced courses in appraisal, mortgage financing, and property development and management also are available through various National Association affiliates.

Trained and experienced agents can advance in many large firms to sales or general manager. Persons who have received their broker's license may open their own offices. Training and experience in estimating property value can lead to work as a real estate appraiser, and people familiar with operating and maintaining rental properties may specialize in property management. Those who gain general experience in real estate, and a thorough knowledge of business conditions and property values in their localities, may enter mortgage financing or real estate counseling.

Almost half of all real estate agents and brokers are women.

Employment Outlook

Employment of real estate agents and brokers is expected to rise faster than the average for all occupations through the 1980's in order to satisfy a growing demand for housing and other properties. In addition, many openings will occur each year as workers die, retire, or leave for other reasons. Replacement needs are high because a relatively large number of people transfer to other work after a short time selling real estate.

The favorable outlook for employment in this field will stem primarily from increased demand for home purchases and rental units. Shifts in the age distribution of the population over the next decade will result in a larger number of young adults with careers and family responsibilities. This is the most geographically mobile group in our society and the one that traditionally makes the bulk of home purchases. As their incomes rise, these families also can be expected to purchase larger homes and vacation properties. During periods of declining economic activity and tight credit, the volume of sales and the resulting demand for sales workers may decline. During these periods, the number of persons seeking sales positions may outnumber openings. Over the long run, however, the outlook for salespeople is excellent.

Many job opportunities should occur for both college graduates and mature workers transferring from other kinds of work. This field will remain highly competitive and prospects will be best for well-trained, ambitious people who enjoy selling. The proportion of part-time real estate agents has declined in recent years as brokers have demanded greater skill and professionalism from those selling real estate. This decline is expected to continue as agents need more specialized knowledge to handle real estate transactions.

Earnings

Commissions on sales are the main source of earnings—very few real estate agents work for a salary. The rate of commission varies according to the type of property and its value; the percentage paid on the sale of farm and commercial properties or unimproved land usually is higher than that paid for selling a home.

Commissions may be divided among several agents in a real estate firm. The person who obtained the listing often receives part of the commission when the property is sold; the broker who made the sale either gets the rest of the commission or shares it with the agent who handled the transaction. Although an agent's share varies greatly from one firm to another, often it is about half of the total amount received by the firm.

Earnings of full-time real estate agents averaged about $15,000 a year in 1978, according to estimates based on a survey conducted by the National Association of Realtors; agents working fewer than 30 hours a week averaged about $5,000. Many experienced real estate agents earn $50,000 a year or more. According to the same survey estimates, real estate brokers earned nearly $30,000 a year in 1978. Full-time agents earn one and one-half times as much and brokers earn nearly three times as much as average earnings for all nonsupervisory workers in private industry, except farming. Some firms, especially the large ones, furnish group life, health, and accident insurance.

Income usually increases as an agent gains experience, but individual ability, economic conditions, and the type and location of the property also affect earnings. Sales workers who are active in community organizations and local real estate boards can broaden their contacts and increase their earnings. A beginner's earnings often are irregular because a few weeks or even months may go by without a sale. Although some brokers allow an agent a drawing account against future earnings, this practice is not usual with new employees. The beginner, therefore, should have enough money to live on until commissions increase.

Related Occupations

Selling expensive items, such as homes, requires certain personal characteristics that are essential for success, including maturity, tact, and a sense of responsibility. Other sales workers who find these character traits important in their work include automobile sales workers, securities sales workers, insurance agents and brokers, yacht brokers, travel agents, and manufacturers' representatives.

Sources of Additional Information

Details on licensing requirements for real estate agents and brokers are available from most local real estate organizations or from the real estate commission or board located in each State capital. Many States can furnish manuals helpful to applicants who are preparing for the required written examinations.

For more information about opportunities in real estate work, as well as a list of colleges and universities offering courses in this field, contact:

National Association of Realtors, 430 N. Michigan Ave., Chicago, Ill. 60611.

Registered Nurses

(D.O.T. 075.117 through .374)

Nature of the Work

Nursing plays a major role in health care. As important members of the health care team, registered nurses perform a wide variety of functions. They observe, assess, and record symptoms, reactions, and progress of patients; administer medications; assist in the rehabilitation of patients; instruct patients and family members in proper health maintenance care; and help maintain a physical and emotional environment that promotes recovery.

Some registered nurses provide nursing services in institutions such as hospitals and nursing homes. Others perform research activities or instruct students. The setting usually determines the scope of the nurse's responsibilities.

Hospital nurses constitute the largest group of nurses. Most are staff nurses who provide skilled bedside nursing care and carry out the medical regimen prescribed by physicians. They may also supervise practical nurses, aides, and orderlies. Hospital nurses usually work with groups of patients that require similar nursing care. For instance, some nurses work with patients who have had surgery; others care for children, the elderly, or the mentally ill. Some are administrators of nursing services.

Registered nurses working in nursing homes provide bedside nursing care to patients convalescing from surgery or an illness, to those suffering from chronic illnesses and disabilities, and to the elderly. They also supervise licensed practical nurses and nursing aides.

Private duty nurses give individual care to patients who need constant attention. The private duty nurse is self-employed and may work in a home, a hospital, or a convalescent institution.

Community health nurses care for patients in clinics, homes, schools, and other community settings. They instruct patients and families in health care and give periodic care as prescribed by a physician. They also may instruct community groups in proper diet and arrange for immunizations. These nurses work with community leaders, teachers, parents, and physicians in community health education. Some community health nurses work in schools.

Office nurses assist physicians, dental surgeons, and occasionally dentists in private practice or clinics. Sometimes they perform routine laboratory and office work in addition to their nursing duties.

Occupational health or industrial nurses provide nursing care to employees in industry and government and, along with physicians, promote employee health. As prescribed by a doctor, they treat minor injuries and illnesses occurring at the place of employment, provide for the needed nursing care, arrange for further medical care if necessary, and offer health counseling. They also may assist with health examinations and inoculations.

Nurse educators teach students the principles and skills of nursing, both in the classroom and in direct patient care. They also conduct continuing education courses for registered nurses, practical nurses, and nursing assistants.

Working Conditions

Nurses generally work indoors in well-lighted, comfortable buildings. Community health nurses may be required to travel to patients in all types of weather. Although most of the tasks in nursing are not strenuous, nurses need physical stamina because of the amount of time spent walking and standing. In addition, emotional stability is required in order to cope with human suffering and frequent emergency situations. Because patients in hospitals and nursing homes require nursing care at all times, staff nurses in these institutions may be required to work nights and weekends.

Places of Employment

About 1,050,000 persons worked as registered nurses in 1978. About one-third worked part time.

About 70 percent of all registered nurses worked in hospitals, nursing homes, and related institutions. Community health nurses in government agencies, schools, visiting nurse associations, and clinics numbered about 120,000; nurse educators in nursing schools accounted for about 40,000; and occupational health nurses in industry, about 25,000. About 100,000 more worked in the offices of physicians or other health practitioners, or were private duty nurses hired directly by patients. Most of the others were staff members of professional nurse and other

Premature babies require round-the-clock care.

organizations or worked for State boards of nursing or research organizations.

Training, Other Qualifications, and Advancement

A license is required to practice professional nursing in all States and in the District of Columbia. To qualify, a nurse must be a graduate of a school of nursing approved by the State board of nursing and pass a written State board competency examination. Nurses may be licensed in more than one State, either by examination or endorsement of a license issued by another State.

Three types of educational programs—diploma, bachelor's degree and associate degree—prepare candidates for licensure. Graduation from high school is required for admission to all schools of nursing.

Diploma programs are conducted by hospitals and independent schools and usually require 3 years of training. Bachelor's degree programs usually require 4 years of study in a college or university, although a few require 5 years. Associate degree programs in junior and community colleges require approximately 2 years of nursing education. In addition, several programs provide licensed practical nurses with the training necessary to upgrade themselves to registered nurses while they continue to work part time. These programs generally offer an associate of arts degree. In 1978, about 1,375 programs, (diploma, bachelor's degree, and associate degree) were offered in the United States. In addition, there were about 115 master's degree and several doctoral degree programs providing advanced education in nursing.

Students should select an educational program only after reflecting on their probable field of practice. Those interested in public health, for example, should enroll in a bachelor's degree program. Public health agencies require at least that level of education, and advancement may be limited for nurses without a bachelor's or master's degree in community health nursing. In addition, those planning to work in research, consultation, teaching, clinical specialization, or administration—fields that require education at the master's level, should start their nursing education in a bachelor's program.

Programs of nursing include classroom instruction and supervised nursing practice in hospitals and health facilities. Students take courses in anatomy, physiology, microbiology, nutrition, psychology, and nursing. They also get supervised clinical experience in the care of patients who have different types of health problems. Students in bachelor's degree programs as well as in some of the other programs are assigned to community agencies to learn how to care for patients in clinics and in the patients' homes. Varying amounts of general education are combined with nursing education in all three types of programs.

Students who need financial aid may qualify for federally sponsored nursing scholarships or low-interest loans. Those who want to pursue a nursing career should have a sincere desire to serve humanity and be sympathetic to the needs of others. Nurses must be able to accept responsibility and direct or supervise the activity of others; they must have initiative, and in appropriate situations be able to follow orders precisely or determine if additional consultation is required; and they must use good judgment in emergencies.

From staff positions in hospitals, experienced nurses may advance to head nurse, assistant director, and director of nursing services. A growing movement in nursing, generally referred to as the "nurse practitioner program," is opening new career possibilities. Several post-bachelor's degree programs prepare nurses for highly independent roles in the clinical care and teaching of patients. These nurses practice in primary roles that include pediatrics, geriatrics, community health, mental health, and medical-surgical nursing.

Employment Outlook

Employment opportunities for registered nurses are expected to be favorable through the 1980's. Some competition for more desirable, higher paying jobs is expected in areas where training programs abound. Nurses with a bachelor's degree should have the best prospects in these areas. In addition, some employers—public health departments, for example—now specify the bachelor's degree as the minimum preparation for employment. Opportunities for full- or part-time work in present shortage areas, such as some southern States and many inner-city locations, are expected to be very good through

the 1980's. For nurses who have had graduate education, the outlook is excellent for obtaining positions as administrators, teachers, clinical specialists, and community health nurses.

Growth in employment of registered nurses is expected to be faster than the average for all occupations because of extension of prepayment programs for hospitalization and medical care, expansion of medical services as a result of new medical techniques and drugs, and increased interest in preventive medicine and rehabilitation of the handicapped. In addition to the need to fill new positions, large numbers of nurses will be required to replace those who leave the field each year.

Earnings

Registered nurses who worked in hospitals in 1978 received average starting salaries of about $11,800 a year, according to a national survey conducted by the University of Texas Medical Branch. This was above the average for nonsupervisory workers in private industry, except farming. Registered nurses in nursing homes earned slightly less than those in hospitals. Salaries of industrial nurses averaged $275 a week in mid-1978, according to a survey conducted by the Bureau of Labor Statistics.

In 1979, the Veterans Administration paid inexperienced nurses who had a diploma or an associate degree starting salaries of $11,712 a year; those with a bachelor's degree, $13,700. Nurses employed in all Federal Government agencies earned an average of $16,800 in 1978.

Most hospital and nursing home nurses receive extra pay for work on evening or night shifts. Nearly all receive from 5 to 13 paid holidays a year, at least 2 weeks of paid vacation after 1 year of employment, and also some type of health and retirement benefits.

Related Occupations

Other occupations with responsibilities and duties similar to registered nurses include: Occupational therapists, physical therapists, physicians assistants, and respiratory therapists.

Sources of Additional Information

For information on approved schools of nursing, nursing careers, loans, scholarships, working conditions, and employment opportunities, contact:

Career Information Services, National League for Nursing, 10 Columbus Circle, New York, N.Y. 10009.

Information about employment opportunities in the Veterans Administration is available from:

Department of Medicine and Surgery, Veterans Administration, Washington, D.C. 20420.

Securities Sales Workers

(D.O.T. 251.157-010)

Nature of the Work

When investors want to buy or sell stocks or bonds, they call on securities sales workers to put the "market machinery" into operation. Both individuals who invest a few hundred dollars and large institutions with millions to invest need such services. These workers often are called *registered representatives, account executives*, or *customers' brokers*.

When an investor wishes to "buy" or "sell" securities, sales workers relay the order through their firms' offices to the floor of a securities exchange, such as the New York Stock Exchange on Wall Street. If a security is not traded on an exchange, the sales worker sends the order to the firm's trading department which purchases it directly from a dealer in the over-the-counter market. After the transaction has been completed, the sales workers notifies the customer of the final price.

In addition, securities sales workers provide many related services for their customers. Depending on a customer's knowledge of the market, they may explain the meaning of stock market terms and trading practices; offer financial counseling; devise an individual financial portfolio for the client including securities, life insurance, and other investments; and offer advice on the purchase or sale of a particular security. Not all customers have the same investment goals. Some individuals may prefer long-term investments designed either for capital growth or to provide income over the years; others might want to invest in short-term securities that they hope will rise in price quickly. Securities sales workers furnish information about the advantages and disadvantages of an investment based on each person's objectives. They also supply the latest stock and bond quotations on any security in which the investor is interested, as well as information on the activities and financial positions of the corporations these securities represent.

Securities sales workers may serve all types of customers or they may specialize in one type only, such as institutional investors. They also may specialize in handling only certain kinds of securities, such as mutual funds. Some handle the sale of "new issues," such as corporation securities issued for plant expansion funds.

Beginning securities sales workers spend much of their time searching for customers. They may meet some clients through business and social contacts. But many sales workers find it useful to get additional exposure by teaching adult education investment courses or giving lectures at libraries or social clubs. Telephone solicitation also is not uncommon. Once they have established a clientele, securities sales workers put more effort into servicing existing accounts and less into seeking new ones.

Working Conditions

Securities sales workers usually work in offices where there is much activity. In large offices, for example, rows of sales workers sit at desks in front of "quote boards" that continually flash information on the prices of securities transactions. When sales activity increases, due perhaps to unanticipated changes in the economy, the pace may become very hectic.

Established sales workers usually work the

Securities sales worker discusses transaction with client.

same hours as others in the business community. Beginners who are seeking customers may work longer, however. Some sales workers accommodate customers by meeting with them in the evenings or on weekends.

Places of Employment

About 110,000 persons were employed as securities sales workers in 1978. In addition, a substantial number of people in other occupations also sold securities. These include partners and branch office managers in securities firms as well as insurance agents and brokers offering securities to their customers.

Securities sales workers are employed by brokerage firms, investment bankers, and mutual funds in all parts of the country. Many of these firms are very small. Most sales workers, however, work for a small number of large firms with main offices in big cities (especially in New York) or the approximately 6,000 branch offices in other areas.

Training, Other Qualifications, and Advancement

Because a securities sales worker must be well informed about economic conditions and trends, a college education is increasingly important, especially in the larger securities firms. Although employers seldom require specialized training, courses in business administration, economics, and finance are helpful.

Many employers consider personality traits as important as academic training. Employers seek applicants who are well groomed, able to motivate people, and ambitious. Because maturity and the ability to work independently also are important, a growing number of employers prefer to hire those who have achieved success in other jobs. Successful sales or managerial experience is very helpful to an applicant.

Almost all States require persons who sell securities to be licensed. State licensing requirements may include passing an examination and furnishing a personal bond. In addition, sales workers usually must register as representatives of their firm according to regulations of the securities exchanges where they do business or the National Association of Securities Dealers, Inc. (NASD). Before beginners can qualify as registered representatives, they must pass the Securities and Exchange Commission's General Securities Examination, or examinations prepared by the exchanges or the NASD. These tests measure the prospective representative's knowledge of the securities business. Character investigations also are required.

Most employers provide training to help sales workers meet the requirements for registration. In member firms of all major exchanges, the training period is at least 4 months. Trainees in large firms may receive classroom instruction in security analysis and effective speaking, take courses offered by business schools and other institutions and associations, and undergo a period of on-the-job training. In small firms, and in mutual funds and insurance companies, training programs may be brief and informal. Beginners read assigned materials and watch other sales workers transact business.

The principal form of advancement for securities sales workers is an increase in the number and the size of the accounts they handle. Although beginners usually service the accounts of individual investors, eventually they may handle very large accounts such as those of banks and pension funds. Some experienced sales workers become branch office managers, and supervise other sales workers while continuing to provide services for their own customers. A few representatives may become partners in their firms or do administrative work.

Employment Outlook

The number of securities sales workers is expected to grow more slowly than the average for all occupations through the 1980's. Most job openings will result from the need to replace sales workers who die, retire, or transfer to other jobs.

Some increase in employment of securities sales workers is expected as economic growth and rising personal incomes increase the funds available for investment. Growth in the number and size of institutional investors will occur as more people participate in pension plans, purchase insurance, and contribute to the endowment funds of colleges and other nonprofit institutions. In addition, more workers will be needed to sell securities issued by new and expanding corporations and by State and local governments financing public improvements.

The demand for securities sales workers fluctuates as the economy expands and contracts. Thus, in an economic downturn the number of persons seeking jobs usually exceeds the number of openings—sometimes by a great deal. Over the long run, however, job opportunities for securities sales workers are expected to be more favorable. During severe slumps in market activity, job prospects and income stability will be greater for sales workers who are qualified to provide their clients with complete financial services than for those who rely strictly on commissions from stock transactions. Mature individuals with successful work experience should find many job opportunities.

Earnings

Earnings of full-time, experienced securities sales workers who service individual investors averaged about $29,000 a year in 1978, according to the limited data available. Those who service institutional accounts earned about $57,000. Full-time securities sales workers earn about three times as much as the average for nonsupervisory workers in private industry, except farming.

Trainees usually are paid a salary until they meet licensing and registration requirements. After registration, a few firms continue to pay a salary until the new representative's commissions increase to a stated amount. The salaries paid during training usually range from $900 to $1,200 a month.

After candidates are licensed and registered, their earnings depend on commissions from the sale or purchase of stocks and bonds, life insurance, or other securities for customers. Commission earnings are likely to be high when there is much buying and selling and lower when there is a slump in market activity. Most firms provide sales workers with a steady income by paying a "draw against commission"—that is, a minimum salary based on the commissions which they can be expected to earn. A few firms pay sales workers only salary and bonuses that usually are determined by the volume of company business.

Related Occupations

Similar sales jobs requiring specialized knowledge include insurance agent, real estate agent, and financial service sales agent. Other occupations in the securities business are broker floor representative and securities trader.

Sources of Additional Information

Further information concerning a career as a securities sales worker is available from:

Securities Industry Association, 20 Broad St., New York, N.Y. 10005. (There is a $1 charge for this material.)

Career information also may be obtained from the personnel departments of individual securities firms.

Singers

(D.O.T. 152.047-022)

Nature of the Work

Singing is an age-old form of entertainment which, in one form or another, can be understood and appreciated by almost everyone. Professional singing often requires not only a fine voice but also a highly developed technique and a broad knowledge of music. A small number of singing stars make recordings or go on concert tours in the United States and abroad. Somewhat larger numbers of singers obtain leading or supporting roles in operas and popular music shows, or secure engagements as concert soloists in oratorios and other types of performances. Some singers also become members of opera and musical comedy choruses or other professional choral groups. Popular music singers perform in musical shows of all kinds—in the movies, on the stage, on radio and television, in concerts, and in nightclubs and other places of entertainment. The best known popular music singers make and sell many recordings.

Some singers combine their work as performers with related jobs. Many give private voice lessons. A number of singers teach and direct choruses in elementary and secondary schools. (See the statements on teachers elsewhere in the *Handbook*.) Others give voice training or direct choral groups in churches, synagogues, music conservatories, or colleges and universities.

Working Conditions

Singers generally work at night and on weekends, and must spend much time in practice and rehearsals. Work in the entertainment field is seasonal and few performers have steady jobs. Except for a few well-known concert soloists, opera stars, and top recording artists of popular music, most professional singers experience difficulty in obtaining regular employment and have to supplement their incomes with other kinds of jobs. Moreover, a singing career sometimes is relatively short, since it depends on a good voice, physical stamina, and public acceptance of the artist, all of which may be affected by age.

Places of Employment

About 22,000 persons worked as professional singers in 1978. Many others were employed as music teachers in elementary and secondary schools, colleges, universities, and conservatories throughout the country. Opportunities for singing engagements are concentrated mainly in New York City, Los Angeles, Las Vegas, San Francisco, Dallas, and Chicago—the Nation's chief entertainment centers. Nashville, Tenn., a major center for country and western music, is one of the most important places for employment of singers for "live" performances and recordings. Many singers work part time as singers and choirmasters for churches and synagogues. The various branches of the Armed Forces also offer career opportunities for vocalists.

Training and Other Qualifications

Persons who want to sing professionally should acquire a broad background in music, including its theory and history. The ability to dance may be helpful, since singers sometimes are required to dance. In addition, those interested in a singing career should start piano lessons at an early age to become familiar with music theory and composition. As a rule, voice training should not begin until after the individual has matured physically, although young boys who sing in church choirs receive some training before their voices change. An audition often is required for advanced voice training. Since voice training often continues for years after the singer's professional career has started, a prospective singer must have great determination.

To prepare for careers as singers of classical music, young people can take private voice lessons or enroll in a music conservatory or a school or department of music in a college or university. These schools provide voice training and training in understanding and interpreting music, including music-related training in foreign languages and, sometimes, dramatic training. After completing 4 years of study, the graduate may receive the degree of bachelor of music, bachelor of science or arts (in music), or bachelor of fine arts.

Singers who plan to teach in public schools need at least a bachelor's degree in music and must meet the State certification requirements for teachers. About 750 conservatories and colleges and universities offer a degree program in music education. In addition, about 540 colleges and universities offer training in musical performance, composition, and theory, leading to a bachelor's degree. Most college teachers must have a master's or a doctor's degree, but exceptions may be made for well-qualified artists.

Although voice training is an asset for singers of popular music, many with untrained voices have had successful careers. The typical popular song does not demand that the voice be developed to cover as wide a range on the musical scale as does classical music, and the lack of voice projection may be overcome by use of a microphone.

Young singers of popular songs may become known by participating in local amateur and paid shows. These engagements may lead to employment with local dance bands or rock groups and possibly later with better known ones.

In addition to musical ability, a singing career requires an attractive appearance, poise and stage presence, and perseverance. Singers also must have physical stamina to adapt to frequent traveling and rigorous time schedules, which often include night performances.

Employment Outlook

Employment of singers is expected to grow faster than the average through the 1980's, but competition for jobs will be keen. Many short-term jobs are expected in the opera and concert stage, movies, theater, nightclubs, and other areas. The demand is growing for popular singers who can do radio and television commercials. However, these short-term jobs are not enough to provide steady employment for all qualified singers.

Earnings

Concert singers who were part of a chorus earned a minimum daily rate of $35 in 1978, or $45 to $50 per performance. Members of an opera chorus earned a minimum daily rate of $40, or $45 per performance. A featured soloist received a minimum of $200 for each performance. A few opera soloists and popular singers, however, earned thousands of dollars per performance. Minimum wage rates for group singers on network or syndicated television ranged between $165 and $175 per singer for a 1-hour show. Solo or duo singers received per performance minimums of $350 each.

Professional singers usually belong to a branch of the AFL-CIO union, the Associated Actors and Artistes of America. Singers on the concert stage or in opera belong to the American Guild of Musical Artists, Inc.; those who sing on radio or television or make phonograph recordings are members of the American Federation of Television and Radio Artists; singers in the variety and nightclub field belong to the American Guild of Variety Artists; those who sing in musical comedy and operettas belong to the Actors' Equity Association; and those

Singers generally work at night and on weekends, and must spend much time in practice and rehearsals.

who sing in television or theatrical motion pictures belong to the Screen Actors Guild, Inc.

Related Occupations

Singers express themselves and entertain others through song. Some related occupations include arrangers, choral directors, copyists, music therapists, orchestrators, songwriters, and voice teachers.

Sources of Additional Information

A directory of accredited schools and departments of music is available for $3.25 from:

National Association of Schools of Music, 11250 Roger Bacon Dr., Reston, Va. 22090.

For information regarding programs in music teacher education, contact:

Music Educators National Conference, 1902 Association Dr., Reston, Va. 22091.

Information about certification of private music teachers is available from:

Music Teachers National Association, 2113 Carew Tower, Cincinnati, Ohio 45202.

A brochure entitled *Careers in Music* is available from any of the three organizations listed above.

Social Workers

(D.O.T. 195.107, .117, .137, .164, and .167-010)

Nature of the Work

The ability of people to live effectively in society often is hampered by lack of resources and problems that range from personal to those arising from social unrest. The growing complexity of society has greatly increased the need for social workers to help individuals, families, groups and communities to solve their problems.

The nature of the problem and the time and resources available determine which of three traditional approaches— casework, group work, and community organization— social workers will use or combine to deal with these problems. However, recent curriculums and training have developed new approaches to social work. For example, social workers may now specialize in social institutions, a field which encompasses health and education, or in social problems such as poverty.

In casework, social workers interview individuals and families to understand their problems and secure the appropriate resources, services, education, or job training. In group work, social workers help people understand themselves and others to achieve a common goal. They plan and conduct activities for children, teenagers, adults, older persons, and other groups in community centers, hospitals, nursing homes, and correctional institutions. In community organization, social workers coordinate the efforts of political, civic, religious, business, and union organizations to combat social problems through community programs. For a neighborhood or larger area, they may help plan and develop health, housing, welfare, and recreation services. Social workers often coordinate existing services, organize fundraising for community social welfare activities, and aid in developing new community services.

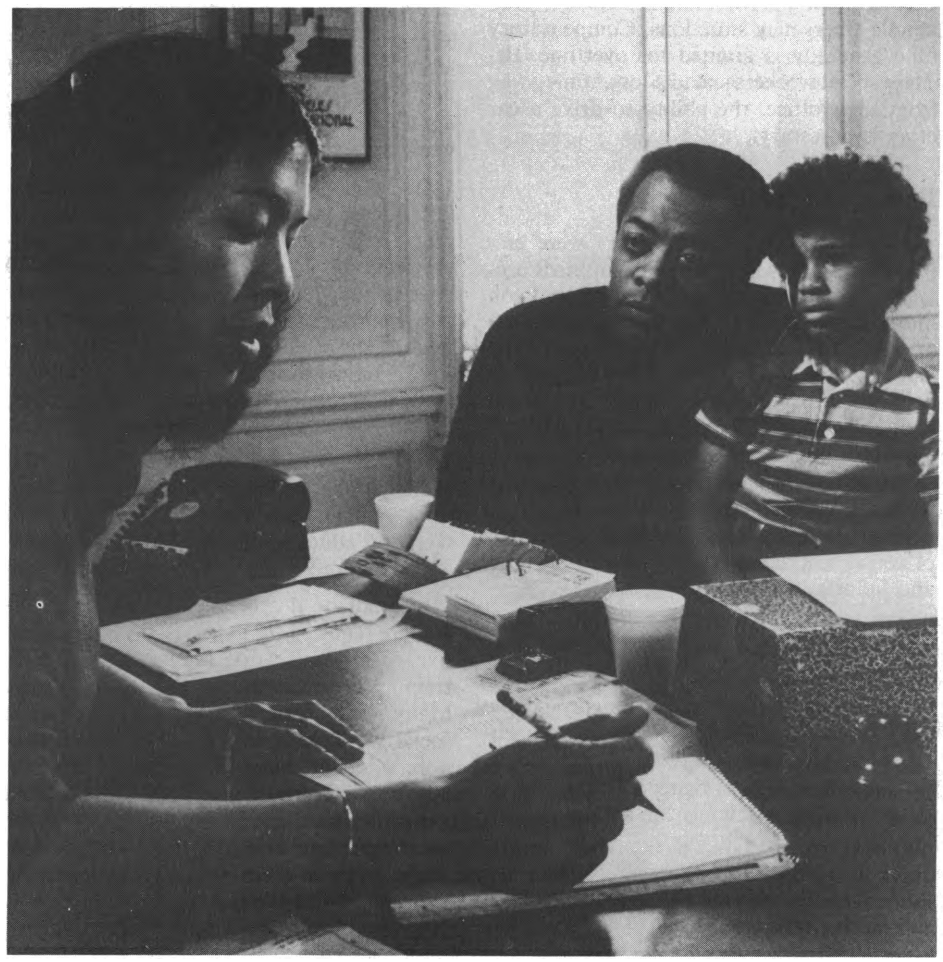
Most social workers deal directly with individuals, families, or groups. However, a substantial number are directors, administrators, or supervisors. Like other administrators, directors of social service agencies hire and train personnel, make budgetary decisions, develop and evaluate agency problems, solicit new funds, supervise staff, and serve as spokespersons for the agencies' clients. Some social workers are college teachers, research workers, or consultants. Others work for community agencies and planning bodies of government, voluntary agencies, and other private organizations.

Social workers apply their training and experience in a variety of settings. Although many work for agencies or institutions, growing numbers are in private practice and provide counseling for a fee.

Social workers for family and child services in public and in voluntary agencies such as those run by religious charities, counsel individuals, work to strengthen personal and family relationships, and help clients to cope with problems. They provide information and referral services in many areas—family budgeting and money management, locating housing, homemaker assistance for the elderly, job training, and day care for parents trying to support a family.

Social workers in child welfare work to improve the physical and emotional well-being of deprived and troubled children and youth. They may advise parents on child care and child rearing, counsel children and youth with social adjustment difficulties, and arrange homemaker services during a parent's illness. Social workers may institute legal action to protect neglected or mistreated children, help unmarried parents, and counsel couples about adoption. After proper evaluation and home visits, they may place and oversee children in foster homes or institutions. When children have unsatisfactory school progress related to social problems, these workers consult with parents, teachers, counselors, and other school and community personnel to identify and solve the underlying problems.

Medical and psychiatric hospitals, clinics, mental health agencies, rehabilitation centers, and public welfare agencies employ so-



Social workers interview people to learn about their problems.

cial workers to help patients and their families with social problems that may accompany illness, recovery, and rehabilitation. Renal social workers (who deal with patients and families of patients and the families of patients suffering from kidney disease) and social workers specializing in drug addiction help patients readadjust to their homes, jobs, and communities. (The related occupation of rehabilitation counselor is discussed in a separate statement.)

A growing number of social workers specialize in the field of aging. They plan and evaluate services for the elderly, and help them deal with finanical and other changes brought about by retirement. In nursing homes, they help patients and their families adjust to illness and the need for institutionalization and health care service.

Social workers in correctional institutions and correctional programs help offenders and persons on probation readjust to society. They counsel on social problems in returning to family and community life, and also may help secure necessary education, training, employment, or community services.

Working Conditions

Most social workers have a 5-day, 35- to 40-hour week. However, many, particularly in private agencies, work part time. Many work evenings and weekends to meet with clients, attend community meetings, and handle emergency situations. Compensatory time generally is granted for overtime. Because social workers spend a lot of time away from their office, the ability to drive a car often is necessary.

Places of Employment

About 385,000 social workers were employed in 1978. Among these, two-thirds provide direct social services for public and voluntary agencies, including State departments of public assistance and community welfare and religious organizations. Most of the remainder are involved in social policy and planning, community organization, and administration in government agencies, primarily on the state and local level; still others work for schools, hospitals, clinics, and other health facilities. A small but growing number of social workers are employed in business and industry.

Although employment is concentrated in urban areas, many work with rural families. A small number of social workers—employed by the Federal Government and the United Nations or one of its affiliated agencies—serve in other parts of the world as consultants, teachers, or technicians and establish agencies, schools, or assistance programs.

Training, Other Qualifications, and Advancement

Only in recent years has the bachelor's degree in social work (BSW), rather than the master's degree (MSW), been fully accepted as the minimum education of the professional social worker. The BSW programs generally provide content in the areas of social work practice, social welfare policies and service, human behavior and the social environment, social research, and supervised field experience. Generally, BSW programs prepare people for direct service positions such as case worker or group worker. Quite a few workers in this field have degrees in the liberal arts or humanities, sociology and psychology being the most prevalent majors. However, opportunities for advancement to high-level supervisory and administrative positions tend to be limited for those without graduate training in social work, and are particularly limited for persons with no formal training in this field.

For many positions, an MSW is preferred or required. Two years of specialized study and supervised field instruction generally are required to earn an MSW. Field placement affords one the opportunity to test his or her suitability for social work practice. At the same time the student may develop expertise in a specialized area and make personal contacts that later are helpful in securing a permanent job. Previous training in social work is not required for entry into a graduate program, but related courses such as psychology, sociology, economics, political science, history, social anthropology, and urban studies, as well as social work, are recommended. Some graduate schools offer accelerated MSW programs for a limited number of highly qualified BSW recipients.However, applicants to graduate programs in social work may face keen competition.

In 1978, about 250 colleges and universities offered accredited undergraduate programs and over 80 offered accredited graduate programs in social work. More than 20 have included courses in gerontology (study of aging). Graduate students may specialize in clinical social work, community organization, administration, teaching, research, social policy planning, and a variety of other areas.

A limited number of scholarships and fellowships are available for graduate education. A few social welfare agencies grant workers "educational leave" to obtain graduate education.

A graduate degree and experience generally are required for supervisory, administrative, or research work; the last also requires training in social science research methods. Many administrators have a background in social work, business or public administration, education, or health administration. For teaching positions, an MSW is required and a doctorate usually is preferred. With the exception of some high-level positions, most applicants for government employment must pass a written exam.

In 1978, 22 States had licensing or registration laws regarding social work practice and the use of professional titles. Usually work experience, an examination, or both, are necessary for licensing or registration, with periodic renewal required. The National Association of Social Workers allows the use of the title ACSW (Academy of Certified Social Workers) for members having a master's degree and at least 2 years of job experience who have passed the ACSW examination. In view of the emerging trend towards specialization at advanced levels of social work practice, efforts are being made to devise specialized examinations in addition to the general ACSW examination currently given.

Social workers should be emotionally mature, objective, and sensitive, and should possess a basic concern for people and their problems. They must be able to handle responsibility, work independently, and maintain good working relationships with clients and coworkers.

During high school and college, students should do volunteer, part-time, or summer work to determine whether they have the interest and capacity for professional social work. Some voluntary and public social welfare agencies occasionally hire students as assistants to social workers.

Employment Outlook

Employment of social workers is expected to increase about as a fast as the average for all occupations through the 1980's as a result of the expansion of social services. These services will include, in public education, programs for teenage mothers and delinquents; health services in hospitals, nursing homes, community mental health centers, and home health agencies; services for the aging; and counseling in the areas of consumerism, rape, and drug and alcohol abuse. Relatively high levels of unemployment coupled with problems caused by social change are expected to sustain a strong demand for persons in the social service field. The increasing need for social workers to assist other professionals in health planning, transportation, law, and public administration also should stimulate employment growth. In addition to jobs resulting from employment growth, thousands of openings will result annually from deaths and retirements.

If the number of students graduating from social work programs continues to increase at the same rate as in the 1970's, persons having a bachelor's degree in social work will face increasing job competition. Graduates of master's and doctor's degree programs in social work are qualified for a wider range of jobs including administrative, research, planning, and teaching positions, and are expected to have good opportunities through the 1980's.

Because many cities are experiencing budget cuts in human services programs, applicants in these departments may face keen competition. Inasmuch as graduates often prefer to work in major metropolitan areas, job opportunities may be more favorable in rural areas and small towns.

Earnings

Salaries for social workers at all levels vary greatly by type of agency (private or public, Federal, State, or local) and geographic region, but generally are highest in large cities and in States with sizable urban populations. Private practitioners, administrators, teachers, and researchers often earn considerably more than social workers in other settings. Average earnings are higher for social workers than for non supervisory workers in private industry, except farming.

Starting salaries for social case workers (positions requiring a BSW) in State and local governments averaged about $10,300 in 1978, according to a survey conducted by the U.S. Office of Personnel Management; for social service supervisors, the average starting salary was $13,700.

The average annual starting salary for social workers (positions requiring an MSW and 1 year of related experience) in hospitals and medical centers was about $13,300 in 1978, according to a survey conducted by the University of Texas Medical School. Top salaries for experienced social workers in these settings averaged $17,000.

In the Federal Government, social workers with an MSW and no other experience started at $15,920 in 1979. Graduates with a Ph. D. or job experience may start at a higher salary. Most social workers in the Federal Government are employed by the Veterans' Administration and the Departments of Health and Human Services, Justice, and Interior.

Most social work agencies provide benefits such as paid vacation, sick leave, and retirement plans.

Related Occupations

Through direct counseling or referral to other services, social workers help people solve a range of personal problems. Workers in occupations with similar duties include: Case aides, clergy members, counselors, parole officess, probation officers, counseling psychologists, and vocational rehabilitation counselors.

Sources of Additional Information

For information about career opportunities in the various fields of social work, contact:

National Association of Social Workers, 1425 H St. NW., Suite 600, Southern Building, Washington, D.C. 20005.

Information on accredited graduate and undergraduate college programs in social work is available from:

Council on Social Work Education, 345 East 46th St., New York, N.Y. 10017.

Sociologists

(D.O.T. 054 and 090.227-010)

Nature of the Work

Sociologists study human society and social behavior by examining the groups that people form. These groups include families, tribes, communities, and governments, as well as a great variety of social, religious, political, business, and other organizations. Sociologists study the behavior and interaction of groups; trace their origin and growth; and analyze the influence of group activities on individual members. Some sociologists concern themselves primarily with the characteristics of social groups and institutions. Others are more interested in the ways individuals are affected by the groups to which they belong.

Fields of specialization for sociologists include social organization, social psychology, rural and urban sociology, racial and ethnic relations, criminology and penology, and industrial sociology. Other important specialties include medical sociology—the study of social factors that affect mental and public health; demography—the study of the size, characteristics, and movement of populations; and social ecology—the study of the effect of the physical environment and technology on the distribution of people and their activities.

Sociological research, like other kinds of social science research, involves collecting information, testing its validity, and analyzing the results. Sociologists usually conduct surveys or do case studies in order to gather the data they need. For example, after providing for controlled conditions, a sociologist might test the effects of different styles of leadership on individuals in a small group. Sociological researchers also conduct large-scale experiments to test the efficacy of different kinds of social programs. They might test and evaluate particular programs of income assistance, job training, or remedial education, for example. Increasingly, sociologists apply statistical and computer techniques in their research. The results of sociological research aid educators, lawmakers, administrators, and others interested in social problems and social policy. Sociologists work closely with members of other professions including psychologists, physicians, economists, political scientists, anthropologists, and social workers.

Most sociologists are college and university teachers. Like other college faculty, they may conduct research, do consulting work, or handle administrative duties in addition to teaching. (For more information, see the *Handbook* statement on college and university faculty.)

Some sociologists are primarily administrators. They apply their professional knowledge in areas of practice as diverse as intergroup relations, family counseling, public opinion analysis, law enforcement, education, personnel administration, public relations, regional and community planning, and health services planning. They may, for example, administer social service programs in family and child welfare agencies or develop social policies and programs for government, community, youth, or religious organizations.

A number of sociologists are employed as consultants. Using their expertise and their social science research skills, they advise on such diverse problems as halfway houses and foster care for the mentally ill, ways of counseling ex-offenders, and market research for advertisers and manufacturers. Increasingly, sociologists are involved in the evaluation of social and welfare programs. Some do technical writing and editing.

Working Conditions

Most sociologists do a lot of desk work, reading and writing reports on their research. Those employed by colleges and universities have flexible work schedules, dividing their time among teaching, research, consulting, and administrative responsibilities. Those working in government agencies and private firms, on the other hand, have more structured work schedules. Like other professionals in such settings, many experience the pressures of deadlines, tight schedules, and heavy workloads, and sometimes must work overtime. Their routine may be interrupted by numerous telephone calls, letters, requests for information, and meetings. Travel may be required to collect data for research projects or attend professional conferences.

Places of Employment

About 19,000 persons were employed as sociologists in 1978. Colleges and universities employ about four-fifths of all sociologists. A number work for government agencies at all levels and deal with such subjects as poverty, public assistance, population policy, social rehabilitation, community development, and environmental impact studies. Sociologists in the Federal Government work primarily for the Departments of Defense, Health and Human Services, Education, Interior, and Agriculture. Others are employed by the Departments of Transportation and Energy, the Environmental Protection Agency, and the Veterans Administration. Some persons with training in sociology work as social science analysts, statisticians, and in other positions for Federal agencies.

Some sociologists hold managerial, research, and planning positions in corporations, research firms, professional and trade associations, consulting firms, and welfare or other nonprofit organizations. Others run their own research or consulting businesses.

Since sociology is taught in most institutions of higher learning, sociologists may be found in nearly all college communities. They are most heavily concentrated, however, in large colleges and universities that

offer graduate training in sociology and opportunities for research.

Training, Other Qualifications, and Advancement

A master's degree in sociology usually is the minimum requirement for employment as a sociologist. Sociologists with master's degrees can qualify for administrative and research positions in public agencies and private businesses, provided they have sufficient training in research, statistical, and computer methods. However, advancement opportunities generally are more limited for master's degree holders than for Ph.D's. Sociologists with master's degrees may qualify for teaching positions in junior colleges and for some college instructorships. Many colleges, however, appoint as instructors only people who have training beyond the master's degree level—frequently the completion of all requirements for the Ph. D. degree except the doctoral dissertation. Although financial aid is increasingly difficult to obtain, some outstanding graduate students may get teaching or research assistantships that provide both financial aid and valuable experience.

The Ph.D. degree is required for appointment to permanent teaching and research positions in colleges and universities. The doctorate also is essential for senior level positions in nonacademic research institutes, consulting firms, corporations, and government agencies.

Bachelor's degree holders in sociology may get jobs as interviewers or as administrative or research assistants. Many work as social workers, counselors, or recreation workers in public and private welfare agencies. Sociology majors who have sufficient training in statistical and survey methods may qualify for positions as junior analysts or statisticians in business or research firms or government agencies.

Over 140 colleges and universities offer doctoral degree programs in sociology; most of these also offer a master's degree. In 150 schools, the master's is the highest degree offered, and about 900 schools have bachelor's degree programs. Sociology departments offer a wide variety of courses including sociological theory, statistics and quantitative methods, dynamics of social interaction, sex roles, population, social stratification, social control, small group analysis, rural-urban relations, formal and complex organizations, sociology of religion, law, the arts, war, politics, education, occupations and professions, and mental health, in addition to many others.

Some departments of sociology have highly structured programs while others are relatively unstructured and leave course selection largely up to the individual student. Departments have different requirements regarding foreign language skills; courses in statistics; and completion of a thesis for the master's degree.

In the Federal Government, candidates generally need a college degree including 24 semester hours in sociology, with course work in theory and methods of social research. However, since competition for the limited number of positions is so keen, advanced study in the field is highly recommended.

The choice of a graduate school is important for people who want to become sociologists. Students should select schools that have adequate research facilities and offer appropriate areas of specialization such as theory, demography, or quantitative methods. Opportunities to gain practical experience also may be available, and sociology departments frequently help place students in business firms and government agencies.

The ability to handle independent research is important for sociologists. Intellectual curiosity is an essential trait; researchers must have inquiring minds and a desire to find explanations for the phenomena they observe. Like other social scientists, sociologists must be objective in gathering information about social institutions and behavior; they need analytical skills in order to organize data effectively and reach valid conclusions; and they must be careful and systematic in their work. Because communicating their findings to other people is such an important part of the job, sociologists must be able to formulate the results of their work in a way that others will understand. The ability to speak well, and to write clearly and concisely, is a "must" in this field.

Employment Outlook

Employment of sociologists is expected to increase more slowly than the average for all occupations through the 1980's. Most openings will result from deaths, retirements, and other separations from the labor force. Some academic openings may result from the growing trend to add sociology courses to the curriculums of other academic disciplines, such as medicine, law, business administration, and education. Demand in the nonteaching area will center around the increasing involvement of sociologists in the evaluation and administration of programs designed to cope with social and welfare problems.

The number of persons who graduate with advanced degrees in sociology through the 1980's is likely to exceed greatly the available job openings. Graduates with a Ph. D. face increasing competition, particularly for academic positions, although those with degrees from the most outstanding institutions may have an advantage in securing teaching jobs. Academic institutions increasingly seek persons qualified to perform a dual role: Teach and also conduct applied research in a university-affiliated organization such as a center for environmental studies. Job search time for new graduates seeking academic jobs will be longer than in the past, and some Ph. D.'s may accept temporary, part-time positions as instructors.

Other Ph. D.'s may find research and administrative positions in government, corporations, research organizations, and consulting firms. Those well trained in quantitative research methods, including survey techniques, advanced statistics, and computer science will have the widest choice of jobs. For example, private firms that contract with the government to evaluate social programs and conduct other research increasingly seek sociologists with strong quantitative skills. Demand is expected to be strong for those with training in applied sociological areas including criminology, deviant behavior, medical sociology, and family and sex roles, among others. Sociologists with training in other applied disciplines, such as public policy, public administration, and business administration, will be attractive to employers seeking managerial and administrative personnel.

Persons with a master's degree will continue to face very keen competition for academic positions, although some may find jobs in junior and community colleges. They also will face strong competition for the limited number of positions as sociologists open to them in nonacademic settings. Some may find research and administrative jobs in government, research firms, and corporations.

Bachelor's degree holders will find few opportunities for jobs as professional sociologists. As in the past, many graduates will take positions as trainees and assistants in government, business, and industry. Training in quantitative research methods provides these graduates with the most marketable skills. For those planning to continue their studies in law, journalism, social work, recreation, counseling, and other related disciplines, sociology provides an excellent background. Some who meet State certification requirements may enter high school teaching.

Earnings

According to the 1977-78 College Placement Council Salary Survey, bachelor's degree candidates in the social sciences received offers averaging around $10,700 a year; master's degree candidates in the social sciences, around $13,200.

The Federal Government recognizes education and experience in certifying applicants for entry level positions. In general, the entrance salary for sociologists with a bachelor's degree was $10,507 or $13,014 a year in 1979, depending upon the applicant's academic record. The starting salary for those with a master's degree was $15,920 a year, and for those with a Ph. D., $19,263. Sociologists in the Federal Government averaged around $25,000 a year in 1978.

According to a 1977 survey by the National Research Council, the median annual salary of all doctoral social scientists (including sociologists) was $23,800. For those in educational institutions, it was $22,800; in the Federal Government, $32,900; in State and local government, $21,300; in other non-

profit organizations, $27,700; and in business and industry, $30,100.

In general, sociologists with the Ph. D. degree earn substantially higher salaries than those without the doctoral degree. Many sociologists, particularly those employed by colleges and universities for the academic year, supplement their regular salaries with earnings from other sources, such as summer teaching and consulting work.

Related Occupations

Sociologists are not the only people whose jobs require an understanding of social processes and institutions. Others whose work demands such expertise include anthropologists, economists, geographers, historians, political scientists, psychologists, urban planners, marketing research workers, newspaper reporters, and social workers.

Sources of Additional Information

Additional information on careers, job openings, and graduate departments of sociology is available from:

The American Sociological Association, Career and Research Division, 1722 N St. NW., Washington, D.C. 20036.

Soil Conservationists

(D.O.T. 040.061-054)

Nature of the Work

Soil conservationists provide technical assistance to farmers, ranchers, and others concerned with the conservation of soil and water. They help farmers and other land managers develop programs that make the most productive use of land without damaging it. Soil conservationists do most of their work in the field. If a farmer is experiencing an erosion problem, the conservationist will visit the farm, find the source of the problem, and develop a program to combat the erosion. For example, if the erosion is caused by water runoff on sloped fields, the conservationist may recommend ways to terrace the land, or construct waterways for the runoff that do not remove soil. If erosion results from wind, the conservationist may recommend growing hedges in places that will provide windbreaks or may suggest improved methods of farming, such as leaving the wheat or corn stalks on the field after harvesting to provide ground cover.

In many areas of the country—particularly in the West—rainfall is insufficient to permit the growing of crops. Much of this land, however, can be made suitable for grazing livestock if proper water conservation techniques are used. Soil conservationists inspect rangeland and recommend to farmers areas where ponds can be constructed to provide water for livestock. They also recommend solutions to problems of overgrazing, such as seeding grassland or placing salt licks in undergrazed areas to keep the livestock away from areas that have been overgrazed. In this manner they can distribute herds so that the concentration of animals in any one area does not exceed the replaceable food supply.

Soil conservationists pay close attention to weather patterns in order to be aware of possible conservation problems before they arise. During the winter months, they make periodic snowmobile or ski patrols into the Rockies and other mountainous areas of the West to measure snowfall. This enables them to predict the spring and summer water runoff. In years when the snowfall is light, they alert irrigation districts, farmers, and other water users to possible water shortages and develop appropriate water conservation measures.

In addition to working with individual farmers and ranchers, soil conservationists work as technical advisors to Soil and Water Conservation Districts when solving area-wide land management problems. A Soil and Water Conservation District is made up of a group of individuals within a county who are concerned with, and responsible for, conservation problems within the area. Soil conservationists working with conservation districts prepare maps of the district, or parts of the district, depicting particular problems of soil and water conservation. They then use the maps to plan and develop a conservation program for the entire area, whether it is only a few farms and ranches or an entire watershed.

Working Conditions

Soil conservationists do most of their work in the field. When the weather is bad, they usually work in their offices, but occasionally they have to work outdoors in inclement weather.

As is the case with other conservation workers, a large part of the soil conservaiontist's job involves working with other people. They spend a good deal of time, for example, working directly with farmers, ranchers, and other land managers in developing conservation programs for their landholdings. When developing a conservation program for a large area, such as a conservation district, soil conservationists may confer with other conservation workers, as well as representative landowners and other concerned persons.

Places of Employment

About 9,000 soil conservationists were employed in 1978, mostly by the Federal Government in the U.S. Department of Agriculture's Soil Conservation Service or in the Department of the Interior's Bureau of Indian Affairs. Soil conservationists employed by the Department of Agriculture work with Soil and Water Conservation Districts in almost every county in the country. Those employed by the Bureau of Indian Affairs generally work near or on Indian reservations, most of which are located in the Western States. In addition to those who work for the Federal Government, others are employed by State and local governments, and some teach at colleges and universities.

Some soil conservationists are employed by rural banks, insurance firms, and mortgage companies that make loans for agricultural lands. A few also work for public utilities and lumber and paper companies that have large holdings of forested lands.

Training, Other Qualifications, and Advancement

Very few colleges and universities offer degrees with a major in soil conservation. Most soil conservationists, especially those employed by the Soil Conservation Service, have degrees in agronomy, agricultural education, or general agriculture. A few soil conservationists have degrees in related fields of the natural resource sciences, such as wildlife biology, forestry, and range management. Programs of study generally must include 30 semester hours in natural resources or agriculture, including at least 3 hours in soils.

A background in agricultural engineering is very helpful to soil conservationists, and courses in cartography, or mapmaking, also are helpful. Soil conservationists must be able to communicate well with people, since much of their work consists of assisting farmers and ranchers in planning and applying sound conservation practices. Also, they must be able to prepare written reports and plans of programs to present to farmers, range managers, and Soil and Water Conservation Districts.

Opportunities for advancement are somewhat limited. However, conservationists working at the county level may advance to the State level. Also, soil conservationists can transfer to related occupations such as farm management advisors or land appraisers. Those with advanced degrees may find teaching opportunities in colleges and universities.

Employment Outlook

Employment of soil conservationists is expected to increase about as fast as the average for all occupations through the 1980's. In addition to employment growth, several hundred openings will occur each year from the need to replace conservationists who die, retire, or transfer to other occupations. For example, even though employment of conservationists in the Soil Conservation Service has not increased over the past decade, the Department of Agriculture has hired, on the average, about 400 new conservationists each year.

Employment growth will occur in banks, public utilities, and other organizations that make loans on agricultural lands or that have large holdings of farm or ranch lands. Many of these organizations are adding conservationists to their staffs to help preserve the value of farmlands on which they hold mortgages or to help them comply with recent conservation and antipollution laws. In addi-

Soil conservationists check the root systems of vegetation planted to help prevent erosion.

tion, as concern for the environment and interest in conserving the productivity of agricultural lands increase, a larger number of colleges may add soil conservation majors to their degree programs, which would increase the demand for soil conservationists to fill teaching positions. However, because this is a very attractive job choice for many people, competition may make it difficult to find jobs in this field.

Earnings

Soil conservationists who had a bachelor's degree and were employed by the Federal Government received $10,507 a year in early 1979. Advancement to $13,014 could be expected after 1 year of satisfactory service. Those who had outstanding records in college, or who had a master's degree, started at $13,014 and could advance to $15,920 after 1 year. Further advancement depends upon the individual's ability to accept greater responsibility. Earnings of well-qualified Federal soil conservationists with several years' experience range from $19,263 to $32,442 a year.

Related Occupations

Other workers who use science to help conserve and protect our natural resources include animal scientists, agronomists, aquatic biologists, biomedical engineers, foresters, geneticists, horticulturists, plant pathologists, range managers, soil scientists, and wood technologists.

Sources of Additonal Information

Additional information on employment as a soil conservationist may be obtained from the Employment Division, Office of Personnel, U.S. Department of Agriculture, Washington, D.C. 20250; or any office of the Department's Soil Conservation Service.

Soil Scientists

(D.O.T. 040.061-058)

Nature of the Work

Soil scientists study the physical, chemical, biological, and behavioral characteristics of soils, one of our most valuable resources. After investigating the soil at various places within an area and analyzing samples in the laboratory, the soil scientist prepares a map, usually based on aerial photographs, which shows soil types throughout the area as well as landscape features, such as streams or hills, and physical features, such as roads.

Because different types of soil are better suited for some uses than others, soil type maps are invaluable for urban and regional planners concerned with land use. A planner who may wish to locate large buildings, such as factories or apartment buildings, on a secure base would look for firm soils containing clay. In contrast, sandy soils drain much better than clays, and thus are better suited for uses that require good drainage, such as farming. In addition, a small but increasing number of States require certified soil scientists to examine soils and determine their drainage capacities before issuing building permits for lots on which residences using septic systems are to be built.

Besides the many soil scientists who are employed mapping soils, some conduct research into the chemical and biological properties of soils to determine their agricultural uses. With the assistance of agricultural technicians, they set up experiments in which they grow crops in different types of soils to determine which are most productive for certain crops. They also may test and develop fertilizers for particular soils and try to find ways to improve less productive soils. Other soil scientists, who have backgrounds in the biological sciences, may investigate and study the effect of organic materials in soils on plant growth.

In recent years, research spurred by mounting concern over water pollution has found that sediment, or soil runoff, is responsible for much of the problem. To meet standards of Federal anti-pollution laws, many States now employ soil scientists to inspect large highway and building sites where vegetation has been removed, and agricultural lands where fertilizers have been applied, to make sure proper erosion control methods have been followed.

Working Conditions

Soil scientists spend much time outdoors. Their work requires a good deal of travel within an assigned area—usually a county. Their employers generally provide a car.

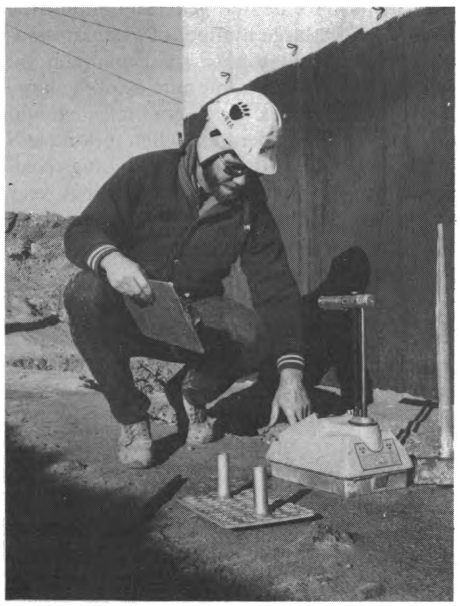
During bad weather, soil scientists do their office work, such as preparing maps and writing reports. Research scientists conduct experiments in fields, greenhouses, and laboratories much of the time.

Places of Employment

The estimated 3,500 soil scientists employed in 1978 worked in every State and nearly every county. About half were employed by the Soil Conservation Service of the U.S. Department of Agriculture. Some worked for other agencies of the Federal Government, State agricultural experiment stations, and colleges of agriculture. Others were employed in a wide range of other public and private institutions, including fertilizer companies, private research laboratories, insurance companies, banks and other lending agencies, real estate firms, land appraisal boards, State conservation departments, and farm management agencies. A few were independent consultants, and others worked for consulting firms. In addition, some soil scientists worked in foreign countries as research leaders, consultants, and agricultural managers.

Training, Other Qualifications, and Advancement

Training in a college or university is important to obtain employment as a soil scientist. For Federal employment, the minimum qualification for entrance is a bachelor's degree with a major in soil science or in a closely related field of study, with 30 semester hours of course work in the biological,-physical, and earth sciences, including a minimum of 12 semester hours in soils. For students interested in working in the Soil Conservation Service, one of the best courses of study is agronomy, the study of how plants and soils interact. Also, a major in agriculture may enable an applicant to find employment with the Soil Conservation Service.



Construction companies hire soil scientists to evaluate soils for their suitability for various kinds of buildings.

Soil scientists trained in both field work and laboratory research may have the edge in obtaining the best jobs, and an advanced degree—especially a doctorate degree—may be needed to advance to more responsible and better paying research jobs. Also, a strong background in chemistry may be necessary to obtain research positions.

Many colleges and universities offer fellowships and assistantships for graduate training, or employ graduate students for part-time teaching or research.

A few States now require certification of soil scientists who inspect soil conditions before construction is started. One program requires that candidates for certification have a bachelor's degree and 3 years of experience as a soil scientist, or a master's degree and 2 years of experience. In addition, candidates must complete a written examination to demonstrate their knowledge of soil science.

Soil scientists often can transfer to other occupations that require a knowledge of soil and land, such as land appraiser or farm management advisor.

Employment Outlook

A major objective of the Soil Conservation Service is to complete the classification of soils of all rural lands in the United States. Although the number of soil scientists working on this project has not changed over the past decade, about 100 openings arise each year to replace those scientists who retire, die, or leave the Soil Conservation Service for other reasons.

Some additional employment of soil scientists may be expected in State and local government agencies as concern for pollution and destruction of our soil resources increases. Growth also is expected in businesses such as fertilizer manufacturers, and in institutions that make loans for farm lands, such as banks, mortagage companies, and life insurance companies.

Earnings

In 1978, soil scientists in the Federal Government—the major employer of these workers—had estimated average annual salaries of $22,000. The incomes of soil scientists, however, depend upon their education, professional experience, and individual abilities. The entrance salary in the Federal service for graduates having a B.S. degree was $10,507 in early 1979. They may expect advancement to $13,014, after 1 year of satisfactory per formance. Those who had outstanding records in college, or a master's degree, started at $13,014, and could advance to $15,920 after 1 year. Further promotion depends upon the individual's ability to do high quality work and to accept responsibility. Well-qualified Federal soil scientists with several years of experience earned between $19,263 and $32,442 a year.

Related Occupations

Workers in other occupations who are concerned with improving the productivity of agriculture through science include agronomists, animal scientists, aquatic biologists, botanists, geneticists, parasitologists, plant pathologists, range managers, and soil conservationists. Other occupations that require a knowledge of soil and land include land appraisers and farm management advisors.

Sources of Additional Information

Additional information may be obtained from the U.S. Department of Agriculture, Office of Personnel, Washington, D.C. 20250; any office of the Department's Soil Conservation Service; any college of agriculture; or the Soil Society of America, 677 S. Segoe Rd., Madison, Wis. 53711.

Information on soil scientists jobs in the Federal Government also is available from Federal Job Information Centers operated by the U.S. Office of Personnel Management. These centers, located throughout the country, are listed in the telephone directory.

See also the statements on chemists, life scientists, and soil conservationists elsewhere in the *Handbook*.

Speech Pathologists and Audiologists

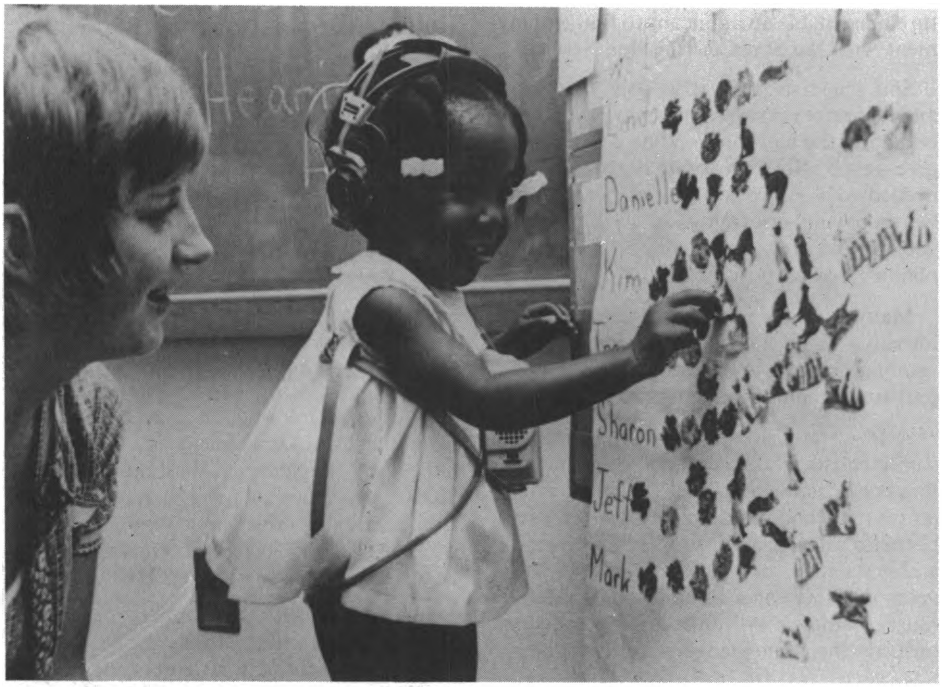
(D.O.T. 076.101 and .107)

Nature of the Work

About 1 out of 10 Americans is unable to speak or hear clearly. Children who have trouble speaking or hearing cannot participate fully with other children in play or in normal classroom activities. Adults with speech or hearing impairments often have adjustment problems in jobs. Speech pathologists and audiologists provide direct services to these people by evaluating their speech or hearing disorders and providing treatment.

The speech pathologist works with children and adults who have speech, language, and voice disorders resulting from causes such as total or partial hearing loss, brain injury, cleft palate, mental retardation, emotional problems, or foreign dialect. The audiologist primarily assesses and treats hearing problems. Speech and hearing, however, are so interrelated that, to be competent in one of these fields, one must be familiar with both.

The duties of speech pathologists and audiologists vary with education, experience, and place of employment. In clinics, such as in schools, they use diagnostic procedures to identify and evaluate speech and hearing disorders. Then, in cooperation with physicians, psychologists, physical therapists, and



Considerable patience is required to help people overcome speech and hearing disabilities.

counselors, they develop and implement an organized program of therapy. Some speech pathologists and audiologists conduct research such as investigating the causes of communicative disorders and improving methods for clinical services. Others supervise clinical activities.

Speech pathologists and audiologists in colleges and universities teach courses in the principles of communication, communication disorders, and clinical techniques; participate in educational programs for physicians, nurses, and teachers; and work in university clinics and research centers. Although most speech pathologists and audiologists do some administrative work, directors of speech and hearing clinics and coordinators of speech and hearing in schools, health departments, or government agencies may be totally involved in administration.

Working Conditions

Many speech pathologists and audiologists work more than 40 hours a week. They generally work in clean, comfortable surroundings and spend most of their time at a desk or table. Although the job is not physically demanding, the close attention to detail and intense concentration can be mentally exhausting. These workers receive immense satisfaction from seeing their clients' speech and hearing improve, but a lack of progress can be very frustrating.

Places of Employment

About 32,000 persons worked as speech pathologists and audiologists in 1978. Nearly one-half worked in public schools. Colleges and universities employed many in classrooms, clinics, and research centers. The rest worked in hospitals, speech and hearing centers, government agencies, industry, and private practice.

Training, Other Qualifications, and Advancement

An increasing number of States and many Federal programs (such as Medicare and Medicaid) require a master's degree or its equivalent for speech pathologists and audiologists. Some States require a teaching certificate in order to work in the public schools. In 30 States, those offering speech pathology and audiology services outside of schools must be licensed. Licensure requirements vary among the States.

Undergraduate courses in speech pathology and audiology programs include anatomy, biology, physiology, physics, sociology, linguistics, semantics, and phonetics. Courses in speech and hearing as well as in child psychology and psychology of the exceptional child also are helpful. This training usually is available at colleges that offer a broad liberal arts program.

In 1978, about 230 colleges and universities offered graduate education in speech pathology and audiology. Courses at the graduate level include advanced anatomy and physiology of the areas involved in hearing and speech; acoustics; psychological aspects of communication; and analysis of speech production, language abilities, and auditory processes. Graduate students also take courses in the evaluation and remediation of speech, language, and hearing disorders. All students at the graduate level receive supervised clinical training in communicative disorders.

A limited number of scholarships, fellowships, assistantships, and traineeships are available in this field. Teaching and training grants to colleges and universities that have programs in speech and hearing are given by a number of agencies of the U.S. Department of Health, Education, and Welfare—the Rehabilitation Services Administration, the Maternal and Child Health Service, the Office of Education, and the National Institutes of Health. In addition, some Federal agencies distribute money to colleges to aid graduate students in speech and hearing programs. A large number of private organizations and foundations also provide financial assistance for education in this field.

Meeting the American Speech-Language-Hearing Association's (AS-L-HA) requirements for a Certificate of Clinical Competence (CCC) usually is necessary in order to advance professionally. To earn the CCC, a person must have a master's degree or its equivalent, complete a 1-year internship approved by the Association, and pass a national written examination.

Speech pathologists and audiologists should be able to approach problems objectively and have a concern for the needs of others. They also should have considerable patience, because a client's progress often is slow. A person who desires a career in speech pathology and audiology should be able to accept responsibility, work independently, and direct others. The ability to work with detail also is important.

Employment Outlook

Employment of speech pathologists and audiologists is expected to increase much faster than the average for all other occupations through the 1980's. Although some jobs will be available for those having only a bachelor's degree, the increasing emphasis placed on the master's degree by State governments, school systems, and Federal agencies will limit opportunities at the bachelor's degree level.

While employment opportunities for those with a master's degree generally should be favorable, the large number of graduates entering this field may cause some competition. Many openings will occur outside of the large metropolitan areas, and graduates should take this into consideration when seeking employment. Competition for teaching positions in colleges and universities will be very strong throughout the period.

Population growth, which will increase the number of persons having speech and hearing problems, will contribute to the expected expansion in employment of speech pathologists and audiologists through the 1980's. In addition, there is a trend toward earlier recognition and treatment of hearing and language problems in children. Many school-age children, thought to have learning disabilities, actually have language or hearing disorders that speech pathologists and audiologists can treat.

Other factors expected to increase demand for speech pathologists and audiologists are expansion in expenditures for medical research and the growing public interest in

speech and hearing disorders. State and Federal laws now require school systems to provide equal educational services for handicapped children, and Medicare and Medicaid programs have expanded their coverage of speech and hearing services.

Earnings

Audiologists working in hospitals generally earn slightly more than speech pathologists. According to a national survey conducted by the University of Texas Medical Branch, audiologists averaged starting salaries of about $14,300 a year in 1978, compared to about $14,000 for speech pathologists. Experienced audiologists averaged $18,500 a year, compared to $17,500 for speech pathologists.

In 1979, the annual starting salary in the Federal Government for speech pathologists and audiologists with a master's degree was about $15,900. Those having a doctoral degree were eligible to start at about $19,300. The average salary of all speech pathologists and audiologists working for the Federal Government in 1978 was $24,300.

Many speech pathologists and audiologists, particularly those in colleges and universities, supplement their income by acting as consultants, engaging in research projects, and writing books and articles. Almost all receive benefits such as paid vacations, sick leave, and retirement programs.

Related Occupations

Speech pathologists and audiologists specialize in the diagnosis and treatment of speech, language, and hearing problems. Workers in other professions who also perform rehabilitative functions include occupational therapists, optometrists, and physical therapists.

Sources of Additional Information

State departments of education can supply information on certification requirements for those who wish to work in public schools.

A list of college and university programs and a booklet on student financial aid as well as general career information are available from:

American Speech-Language-Hearing Association, 10801 Rockville Pike, Md. 20852.

State Police Officers

(D.O.T. 375.163-010 and -014, .167-018, and .263.-018)

Nature of the Work

The laws and regulations that govern the use of our Nation's roadways are designed to insure the safety of all citizens. State police officers (sometimes called State troopers or highways patrol officers) patrol our highways and enforce these laws.

State police officers issue traffic tickets to motorists who violate the law. At the scene of an accident, they direct traffic, give first aid, call for emergency equipment including ambulances, and write reports to be used in determining the cause of the accident.

In addition, State police officers provide services to motorists on the highways. For example, they radio for road service for drivers with mechanical trouble, direct tourists to their destination, or give information about lodging, restaurants, and tourist attractions.

State police officers also provide traffic assistance and control during road repairs, fires, and other emergencies, as well as during special occurrences such as parades and sports events. They sometimes check the weight of commercial vehicles, conduct driver examinations, and give information on highway safety to the public.

In addition to highway responsbilities, State police in some States also investigate crimes such as burglary or assault, particularly in areas that do not have a local police force. They sometimes help city or county police catch lawbreakers and control civil disturbances. State highway patrols, however, normally are restricted to vehicle safety and traffic matters on state highway.

Some officers work with special State police units, such as the mounted police, canine corps, and marine patrols. Others instruct trainees in State police schools, pilot police aircraft, or specialize in fingerprint classification or chemical and microscopic analysis of criminal evidence.

State police officers also write reports and maintain police records. Some officers, including division or bureau chiefs responsible for training or investigation and those who command police operations in an assigned area, have administrative duties.

Working Conditions

Although the work of State police officers is usually routine, it sometimes is dangerous. They always run the risk of an automobile accident while pursuing speeding motorists or fleeing criminals. Officers also face the risk of injury while apprehending criminals or controlling disorders. In addition, they must be on patrol in all kinds of weather.

Places of Employment

About 47,000 State police officers were employed in 1978. The size of State police forces varies considerably. The largest force (in California) has over 5,000 officers; the smallest (in North Dakota) has about 100. One State (Hawaii) does not maintain a police force.

Training, Other Qualifications, and Advancement

State civil service regulations govern the appointment of State police officers. All candidates must be citizens of the United States. Other entry requirements vary, but most States require that applicants have a high school education or an equivalent combination of education and experience and be at least 21 years old.

Officers must pass a competitive examination and meet physical and personal qualifications. Physical requirements include standards of height, weight, and eyesight. Tests of strength and agility often are required. Because honesty and a sense of responsibility are important in police work, an applicant's character and background are investigated.

Although State police officers work independently, they must perform their duties in line with department rules.

In all States, recruits enter a formal training program for several months. They receive classroom instruction in State laws and jurisdictions, and they study procedures for accident investigation, patrol, and traffic control. Recruits learn to handle firearms, defend themselves from attack, handle an automobile at high speeds, and give first aid. Some experienced officers take advanced training in police science, administration, law enforcement, or criminology at junior colleges, colleges and universities, or special police institutions such as the National Academy of the Federal Bureau of Investigation.

High school and college courses in English, government, psychology, sociology, American history, and physics help in preparing for a police career. Physical education and sports are useful for developing stamina and agility. Driver education courses and military police training also are helpful.

Police officer recruits serve a probationary period ranging from 6 months to 3 years. After a specified length of time, officers become eligible for promotion. Most States have merit promotion systems that require officers to pass a competitive examination to qualify for the next highest rank. Although the organization of police forces varies from State to State, the typical avenue of advancement is from private to corporal, to sergeant, to first sergeant, to lieutenant, and then to captain.

In some States, high school graduates may enter State police work as cadets. These paid civilian employees of the police organization attend classes on aspects of police work and are assigned nonenforcement duties. Cadets who qualify may be appointed to the State police force at age 21.

Employment Outlook

State police employment is expected to grow about as fast as the average for all occupations through the 1980's. Some openings will also be created as officers retire, die, or leave the occupation for other reasons.

Although some State police will be needed in criminal investigation and other nonhighway functions, the greatest demand will continue to be for officers to work in highway

State police officers issue traffic tickets to motorists who violate the law.

patrol. In ever-increasing numbers, Americans have been using the motor vehicle as a means of transportation and a source of recreation. This growth probably will continue, requiring additional officers to control traffic and maintain highway safety.

Because law enforcement work is becoming more complex, specialists will be needed in crime laboratories and electronic data processing centers to develop administrative and criminal information systems. However, in many departments, these jobs will be filled by civilian employees rather than uniformed officers.

Earnings

In 1978, beginning salaries for State police officers averaged about $13,200 a year. Officers generally receive regular salary increases, based on experience and performance, until a specified maximum is reached. Maximum salaries averaged $17,000 a year, but ranged to nearly $19,000 a year in some States. Salaries are normally higher than average in the West and lower in the South. State police officers on the average earn about one and one-half times as much as nonsupervisory workers in private industry, except farming.

Starting salaries of State police sergeants averaged $15,450 a year in 1978; maximum salaries averaged $19,300. Starting salaries of lieutenants averaged $17,900 a year; maximum salaries, $22,100.

State police agencies usually provide officers with uniforms, firearms, and other necessary equipment, or give special allowances for their purchase. State police officers usually are covered by liberal pension plans. Paid vacations, sick leave, medical insurance, and life insurance plans frequently are provided.

In most States, the scheduled workweek for police officers is 40 hours. Although the workweek is longer in some States, the trend is toward a 40-hour week. Since police protection must be provided around the clock, some officers are on duty over weekends, on holidays, and at night. Police officers also are subject to emergency calls at any time.

Related Occupations

State police officers patrol the Nation's highways and enforce its laws, apprehending speeders and more dangerous lawbreakers. Related law enforcement occupations incude local police officers, deputy sheriffs, detectives, FBI special agents, Secret Service agents, Internal Revenue Service agents, Border Patrol agents, fire marshals, and fish and game wardens.

Sources of Additional Information

Information about specific entrance requirements may be obtained from State civil service commissions or State police headquarters, usually located in each State capital.

Statisticians

(D.O.T. 020.167-022 and -026)

Nature of the Work

Statistics are numbers that help describe the characteristics of the world and its inhabitants. Statisticians devise, carry out, and interpret the numerical results of surveys and experiments. In doing so, they apply their knowledge of statistical methods to a particular subject area, such as economics, human behavior, natural science, or engineering. They may use statistical techniques to predict population growth or economic conditions, develop quality control tests for manufactured products, or help business managers and government officials make decisions and evaluate the results of new programs.

Often statisticians are able to obtain accurate information about a group of people or things by surveying a small portion, called a sample, rather than the whole group. For example, television rating services ask only a few thousand families, rather than all viewers, what programs they watch to determine the size of the audience. Statisticians decide where to get the data, determine the type and size of the sample group, and develop the survey questionnaire or reporting form. They also prepare instructions for workers who will tabulate the returns. Statisticians who design experiments prepare mathematical models and written reports. Some statisticians, called mathematical statisticians, use mathematical theory to design and improve statistical methods.

Because the field of statistics has such a wide application, it sometime is difficult to distinguish statisticians from specialists in other fields who use statistics. For example, a statistician working with data on economic conditions may have the title of economist.

Working Conditions

Statisticians usually work regular hours in offices. Some statisticians may travel occasionally to supervise or set up a survey, or to gather statistical data. Some statisticians spend all day at their desk doing fairly repetitive tasks, while others may be involved in a variety of tasks.

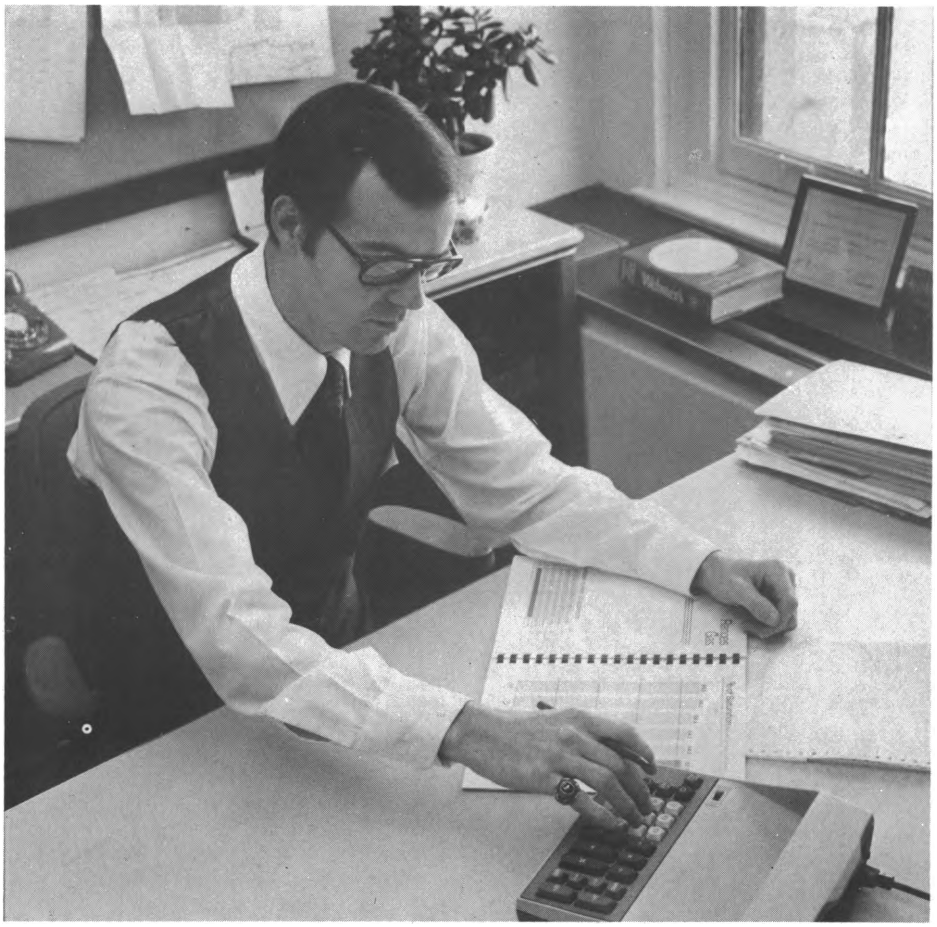
Places of Employment

Approximately 23,000 persons worked as statisticians in 1978. Over half of all statisticians were in private industry, primarily in manufacturing, finance, and insurance companies. Roughly one-fifth worked for the Federal Government, primarily in the Departments of Commerce; Health, Education, and Welfare; Agriculture; and Defense. Others worked in State and local government and in colleges and universities.

Although statisticians work in all parts of the country, most are in metropolitan areas, and about one-fourth work in three areas—New York City; Washington, D.C.; and Los Angeles-Long Beach, Calif.

Training, Other Qualifications, and Advancement

A bachelor's degree with a major in statistics or mathematics is the minimum educational requirement for many beginning jobs in statistics. For other beginning statistical jobs, however, a bachelor's degree with a major in an applied field such as economics or natural science and a minor in statistics is preferable. A graduate degree in mathemat-



Statisticians devise, carry out, and interpret the numerical results of surveys and experiments.

ics or statistics is essential for college and university teaching. Most mathematical statisticians have at least a bachelor's degree in mathematics and an advanced degree in statistics.

Over 100 colleges and universities offered statistics as a concentration for a bachelor's degree in 1978. Many schools also offer either a degree in mathematics or a sufficient number of courses in statistics to qualify graduates for beginning positions. Required subjects for statistics majors include mathematics through differential and integral calculus, statistical methods, and probability theory. Courses in computer uses and techniques, if not required, are highly recommended. For quality-control positions, training in engineering or physical or biological science and in the application of statistical methods to manufacturing processes is desirable. For many market research, business analysis, and forecasting jobs, courses in economics and business administration are helpful.

Nearly 90 colleges and universities offered graduate degrees in statistics in 1978, and many other schools offered one or two graduate level statistics courses. Acceptance into graduate programs does not require an undergraduate degree in statistics although a good mathematics background is essential.

Beginning statisticians who have only the bachelor's degree often spend much of their time performing routine work under the supervision of an experienced statistician. Through experience, they may advance to positions of greater technical and supervisory responsibility. However, opportunities for promotion are best for those with advanced degrees.

Employment Outlook

Employment opportunities for persons who combine training in statistics with knowledge of a field of application are expected to be favorable through the 1980's. Besides the faster-than-average growth expected in this field, additional statisticians will be needed to replace those who die, retire, or transfer to other occupations.

Private industry will require increasing numbers of statisticians for quality control in manufacturing. Statisticians with knowledge of engineering and the physical sciences will find jobs working with scientists and engineers in research and development. Business firms will rely more heavily than in the past on statisticians to forecase sales, analyze business conditions, modernize accounting procedures, and help solve management problems.

Many fields such as law and history have recognized the usefulness of statistics, and statistical techniques are being used increasingly to determine such things as the effects of pollution and toxic substances. As the use of statistics expands into new areas, more statisticians will be needed.

Federal, State, and local government agencies will need statisticians for existing and new programs in fields such as transportation, social security, health, and education. The broader use of statistical methods is also likely to result in a need for more teachers of statistics in colleges and universities.

Earnings

In the Federal Government in 1979, statisticians who had the bachelor's degree and no experience could start at either $10,507 or $13,014 a year, depending on their college grades. Beginning statisticians with the master's degree could start at $15,920 or $19,263. Those with the Ph. D. could begin at $19,263 or $23,087. The average annual salary for statisticians in the Federal Government was about $26,000 in 1979.

Salaries in private industry were comparable to those in the Federal Government, according to the limited data available.

Statisticians employed by colleges and universities generally receive salaries comparable to those paid other faculty members. (See the statement on college and university faculty.) In addition to their regular salaries, statisticians in educational institutions sometimes earn extra income from outside research projects, consulting, and writing.

Related Occupations

Workers in the following occupations use statistics to such an extent their job is similar to that of a statistician: marketing research workers, urban planners, engineers, environmental scientists, life scientists, physical scientists, and social scientists. Others who work with numbers are actuaries, mathematicians, financial analysts, computer programmers, and systems analysts.

Sources of Additional Information

For information about career opportunities in statistics, contact:

American Statistical Association, 806 15th St. NW., Washington, D.C. 20005.

Information on Federal job opportunities is available from State employment service offices or from U.S. Office of Personnel Management area offices or Federal Job Information Centers located in various large cities throughout the country.

For information on a career as a mathematical statistician, contact:

Institute of Mathematical Statistics, 3401 Investment Blvd. #6, Hayward, Calif. 94545.

Surveyors and Surveying Technicians

(D.O.T. 018.167-010, -018, and -034 through -050)

Nature of the Work

Surveyors with the assistance of surveying technicians establish official land boundaries, research deeds, write descriptions of land to satisfy legal requirements, assist in setting land valuations, measure construction and mineral sites, and collect information for maps and charts.

Surveys are usually conducted by a survey party that determines the precise measurement of distances, directions, and angles between points and of elevations, of points, lines, and contours on the earth's surface. *Land surveyors* (D.O.T. 018.167-018), who may head one or more survey parties, are directly responsible for the party's activities and the accuracy of its work. They plan the fieldwork, select survey reference points, and determine the precise location of natural and constructed features of the survey project area. They record the information disclosed by the survey, verify the accuracy of the survey data, and prepare sketches, maps, and reports.

A typical survey party is made up of the party chief (D.O.T. 018.167-010) and one to six assistants and helpers. The party chief leads the day-to-day work activities of the party. *Instrument assistants* (D.O.T. 018.-167-034) adjust and operate surveying instruments such as the theodolite (used to measure horizontal and vertical angles) and electronic equipment used to measure distances. These workers also compile notes, sketches, and records of the data obtained from using these instruments. *Suveyor helpers* (D.O.T. 869.567-010) use a steel tape to measure distances between surveying points and use a level rod, a stadia rod, range pole, or other equipment to aid instrument assistants in determining elevations, distances, and directions. Surveyor helpers also may clear brush and trees from the survey line and assist in setting survey markers.

Surveyors may specialize in a particular type of survey. Many perform land surveys to locate boundaries of a particular tract of land. They then prepare maps and legal descriptions for deeds, leases, and other documents. Surveyors doing topographic surveys determine elevations, depressions, and contours of an area, and indicate the location of distinguishing surface features such as farms, buildings, forests, roads, and rivers. *Geodetic surveyors* (D.O.T. 018.167-038) make precise, broad-area measurements which take into account the earth's curvature and its geophysical characteristics. *Geophysical prospecting surveyors* (D.O.T. 018.167-042) mark sites for subsurface exploration, usually petroleum related. *Marine surveyors* (D.O.T. 018.167-046) survey harbors, rivers, and other bodies of water to determine shorelines, topography of the bottom, depth, and other features.

Surveyor measures land boundaries before construction starts.

Several closely related occupations are geodesy and photogrammetry. *Geodesists* (D.O.T. 024.061-014) study the size, shape, and gravitational field of the earth. They make the measurements and computations necessary for accurate mapping of the earth's surface. (See statement on geophysicists elsewhere in the *Handbook*.) *Photogrammetrists* (D.O.T. 018.261-026) measure and interpret photographic images to determine the various physical characteristics of natural or constructed features of an area. By applying analytical processes and mathematical techniques to photographs obtained from aerial, space, ground, and underwater locations, photogrammetrists are able to make detailed maps of areas that are inaccessible or difficult to survey by other methods. Control surveys on the ground are made to insure the accuracy of maps derived from photogrammatic techniques.

Working Conditions

Surveyors and surveying technicians usually work an 8-hour day, 5-day week. Sometimes they work longer hours during the summer months when weather conditions are most suitable for surveying.

The work of a survey party is active and sometimes strenuous. Party members often stand for long periods and walk long distances or climb hills with heavy packs of instruments and equipment. They also are exposed to all types of weather. Occasionally they must commute long distances or find temporary housing near the site.

Surveyors spend considerable time performing office duties, such as planning surveys, preparing reports and computations, and drawing maps.

Places of Employment

About 62,000 persons worked as surveyors or surveying technicians in 1978. Federal, State, and local government agencies employ about 1 out of every 10 of these workers. Among the Federal Government agencies are the U.S. Geological Survey, the Bureau of Land Management, the Army Corps of Engineers, the Forest Service, the National Ocean Survey, and the Defense Mapping Agency. Most surveyors and surveying technicians in State and local government agencies work for highway departments and urban planning and redevelopment agencies.

Nearly three-fourths of all surveyors and surveying technicians work for construction companies and for engineering and architectural consulting firms. A sizable number either work for or own firms that conduct surveys for a fee. Surveyors and surveying technicians also work for crude petroleum and natural gas companies and for public utilities.

Training, Other Qualifications, and Advancement

Most persons prepare for surveying work by combining postsecondary school courses in surveying with extensive on-the-job training. Some prepare by obtaining a college degree. Junior and community colleges, technical institutes, and vocational schools offer 1-, 2-, and 3-year programs in surveying. A few 4-year colleges offer bachelor's degrees specifically in surveying, while many others offer several courses in the field.

High school students interested in pursuing a career in surveying should take courses in algebra, geometry, trigonometry, drafting, and mechanical drawing.

High school graduates with no formal training in surveying usually start as surveyor helpers. After several years of on-the-job experience and some formal training in surveying, it is possible to advance to instrument assistant, then to party chief, and finally to licensed surveyor.

Beginners with postsecondary school training in surveying can generally start as instrument assistants. After gaining experience, they usually advance to party chief, and may later seek to become a licensed surveyor. In many instances, promotions to higher level positions are based on written examinations as well as experience.

For those interested in a career as a photogrammetrist, a bachelor's degree in engineering or the physical sciences is usually needed. Most photogrammetry technicians have had some specialized postsecondary school training.

All 50 States require licensing of land surveyors. Licensing requirements are generally quite strict, because once licensed, surveyors can be held legally responsible for their work. Requirements for licensure vary among the States. Generally, the quickest route to licensure is a combination of 4 years of college, 2 to 4 years of experience, and passage of a State licensing exam. In most States, persons also may qualify to take the licensing exam after 5 to 12 years of surveying experience. A few States now require a bachelor's degree, emphasizing surveying, as a prerequisite to licensure.

Surveyors and surveying technicians should have the ability to visualize and understand objects, distances, sizes, and other abstract forms. Also, because surveying mistakes can be very costly, surveyors must perform mathematical calculations quickly and accurately while paying close attention to the smallest detail. Leadership qualities also are important as surveyors must supervise the work of others.

Members of a survey party must be in good physical condition to work outdoors and carry equipment over difficult terrain. They also need good eyesight, coordination, and hearing to communicate over great distances by hand or voice signals.

Employment Outlook

Employment of surveyors and surveying technicians is expected to grow about as fast as the average for all occupations through the 1980's. In addition to the openings resulting from employment growth, many will result from the need to replace those who die, retire, or transfer to other fields of work.

The anticipated rapid growth in construction should create additional jobs for surveyors and surveying technicians to lay out streets, shopping centers, housing developments, factories, office buildings, and recreation areas. In addition, as the value of land and thus the need for accurate surveys increase, more jobs will arise. Construction and improvement of the Nation's roads and highways also will create many new surveying positions. However, employment may fluctuate from year to year because construction activity in sensitive to changes in economic conditions.

Earnings

In the Federal Government in 1979, high school graduates with little or no training or experience started as surveyor helpers with an annual salary of $7,422. Those with 1 year of related postsecondary training earned $8,366. Those with an associate degree that included courses in surveying generally started as instrument assistants with an annual salary of $9,391. In 1978, surveying technicians who worked as party chiefs in the Federal Government earned between $11,000 and $15,000 per year. Land surveyors in the Federal Government averaged about $20,400 per year in 1978.

Although salaries in private industry vary by geographic area, limited data indicate that salaries are generally comparable to those in Federal service and are above the average earnings of nonsupervisory workers in private industry, except farming.

Related Occupations

Other occupations concerned with accurate measurement and delineation of land areas, coastlines, and natural and constructed features include cartographic drafters, field-map editors, geodesists, map editors, mosaicists, photogrammetric engineers, photogrammetrists, and topological drafters.

Sources of Additional Information

Information about training and career opportunities in surveying is available from:

American Congress on Surveying and Mapping, 210 Little Falls St., Falls Church, Va. 22046.

General information on careers in photogrammetry is available from:

American Society of Photogrammetry, 105 North Virginia Ave., Falls Church, Va. 22046.

Systems Analysts

(D.O.T. 003.167-062, 012.167-066, and 020.062-010)

Nature of the Work

Many essential business functions and scientific research projects depend on systems analysts to plan efficient methods of processing data and handling the results. Analysts begin an assignment by discussing the data processing problem with managers or specialists to determine the exact nature of the problem and to break it down into its component parts. If a new inventory system is desired, for example, systems analysts must determine what new data must be collected, the equipment needed for computation, and the steps to be followed in processing the information.

Analysts use various techniques, such as cost accounting, sampling, and mathematical model building to analyze a problem and devise a new system. Once a system has been developed, they prepare charts and diagrams that describe its operation in terms that managers or customers can understand. They also may prepare a cost-benefit analysis to help the client decide whether the proposed system is satisfactory.

If the system is accepted, systems analysts translate the logical requirements of the system into the capabilities of the computer machinery or "hardware." They also prepare specifications for programmers to follow and work with them to "debug," or eliminate errors from the system. (The work of computer programmers is described elsewhere in the *Handbook*.)

The problems that systems analysts solve range from monitoring nuclear fission in a powerplant to forecasting sales for an appliance manufacturing firm. Because the work is so varied and complex, analysts usually specialize in either business or scientific and engineering applications.

Some analysts improve systems already in use by developing better procedures or adapting the system to handle additional types of data. Others do research, called advanced systems design, to devise new methods of systems analysis.

Working Conditions

Systems analysts usually work about 40 hours a week—the same as other professional and office workers. Unlike many computer operators, systems analysts are not assigned to evening or night shifts. Occasionally, however, evening or weekend work may be necessary to complete emergency projects.

Places of Employment

About 182,000 persons worked as systems analysts in 1978. Employment of these workers is concentrated in two geographic regions—about one-third of the total are employed in the Midwest and one-fourth work in the

Analysts begin by discussing a problem to break it down into component parts.

northeastern portion of the United States. Most systems analysts worked in urban areas for manufacturing firms, banks, insurance companies, and data processing service organizations. In addition, large numbers worked for wholesale and retail businesses and government agencies.

Training, Other Qualifications, and Advancement

There is no universally acceptable way of preparing for a job as a systems analyst because employers' preferences depend on the work being done. However, college graduates generally are sought for these jobs, and, for some of the more complex jobs, persons with graduate degrees are preferred. Employers usually want analysts with a background in accounting, business management, or economics for work in a business environment while a background in the physical sciences, mathematics, or engineering is preferred for work in scientifically oriented organizations. A growing number of employers seek applicants who have a degree in computer science, information science, information systems, or data processing. Regardless of college major, employers look for people who are familiar with programming languages. Courses in computer concepts, systems analysis, and data base management systems offer good preparation for a job in this field.

Prior work experience is important. Nearly half of all persons entering this occupation have transferred from other occupations, especially from computer programmer. In many industries, systems analysts begin as programmers and are promoted to analyst positions after gaining experience.

Systems analysts must be able to think logically and should like working with ideas. They often deal with a number of tasks simultaneously. The ability to concentrate and pay close attention to detail also is important. Although systems analysts often work independently, they also work in teams on large projects. They must be able to communicate effectively with technical personnel, such as programmers, as well as with clients who have no computer background.

In order to advance, systems analysts must continue their technical education. Technological advances come so rapidly in the computer field that continuous study is necessary to keep skills up to date. Training usually takes the form of 1- and 2-week courses offered by employers and "software" vendors. Additional training may come from professional development seminars offered by professional computing societies.

An indication of experience and professional competence is the Certificate in Data Processing (CDP). This designation is conferred by the Institute for Certification of Computer Professionals upon candidates who have completed 5 years' experience and passed a five-part examination.

In large data processing departments, persons who begin as junior systems analysts may be promoted to senior or lead systems analysts after several years of experience. Systems analysts who show leadership ability also can advance to jobs as managers of systems analysis or data processing departments.

Employment Outlook

Employment of systems analysts is expected to grow faster than the average for all occupations through the 1980's as computer usage expands, particularly in accounting firms and organizations engaged in research and development. In addition to opportunities that will result from growth in computer usage, some openings will occur as systems analysts advance to managerial positions, become consultants, or enter other occupations. Because many of these workers are relatively young, few positions will result from retirement or death.

The demand for systems analysts is expected to rise as computer capabilities are increased and as new applications are found for computer technology. Sophisticated accounting systems, telecommunications networks, and scientific research are just a few areas where continual study of the potential uses of computer systems is resulting in new approaches to problem solving. Over the next decade, systems analysts also will be developing ways to use the computer's resources to solve problems in areas we have not yet recognized.

Advances in technology that have drastically reduced the size and cost of computer hardware will have differing effects on employment of systems analysts. Employment in data processing firms may not grow as rapidly as in recent years as more small businesses install their own computers rather than rely on a data processing service. This will be offset, however, by a rising demand for analysts to design systems especially for the small computer and geared specifically for problems of small firms.

The outlook for graduates of computer-related curriculums should be excellent. College graduates who have had courses in computer programming, systems analysis, and other data processing areas should also find many opportunities. Persons without a college degree and college graduates unfamiliar with data processing will face competition from the large number of experienced workers seeking jobs as systems analysts.

Earnings

Earnings for beginning systems analysts in private industry averaged about $300 a week in 1978, according to surveys conducted in urban areas by the Bureau of

Labor Statistics and private firms engaged in research on computer occupations. Experienced workers earned from $370 to $420, and lead systems analysts earned from $450 to $460 weekly. In the Federal Government, the entrance salary for recent college graduates with a bachelor's degree was about $200 a week in 1978. Overall, systems analysts earn well over twice as much as the average for all nonsupervisory workers in private industry, except farming.

Systems analysts working in the North and West earned somewhat more than those in the South, and generally their earnings were greater in data processing service firms or in heavy manufacturing than in insurance companies or educational institutions.

Related Occupations

Other workers in mathematics, business, and science who use logic and reasoning ability to solve problems are financial analysts, urban planners, engineers, mathematicians, operations research analysts, and actuaries.

Sources of Additional Information

Further information about the occupation of systems analyst is available from:

American Federation of Information Processing Societies, 1815 North Lynn St., Arlington, Va. 22209.

Association for Systems Management, 24587 Bagley Rd., Cleveland, Ohio 44138.

Information about the Certificate in Data Processing is available from:

The Institute for Certification of Computer Professionals, 35 E. Wacker Dr., Suite 2828, Chicago, Ill. 60601.

Teaching Occupations

Most people would agree that education is a life-long process. At every age we learn from our friends, family, and associates. We also teach others along the way, often unwittingly. But perhaps our most influential educational experiences occur during the years of formal education. During those years, students learn the skills to function in the world around them. They learn about their own interests and goals as they explore many subjects. They also make career decisions and train for productive work. Most significantly, they learn to think for themselves.

Today, about 3 million teachers are involved at all levels of this educational process. Teachers work with people of all ages in a variety of different subjects. Some teach youngsters in their first years away from home, while others work primarily with adults who are taking courses for recreation, personal fulfillment, or to increase their job-related skills. Some teachers are members of other professions and instruct part time.

Detailed information on teaching occupations and the outlook for teachers through the 1980's is presented in the following statements.

Kindergarten and Elementary School Teachers

(D.O.T. 092.227-010 and -014)

Nature of the Work

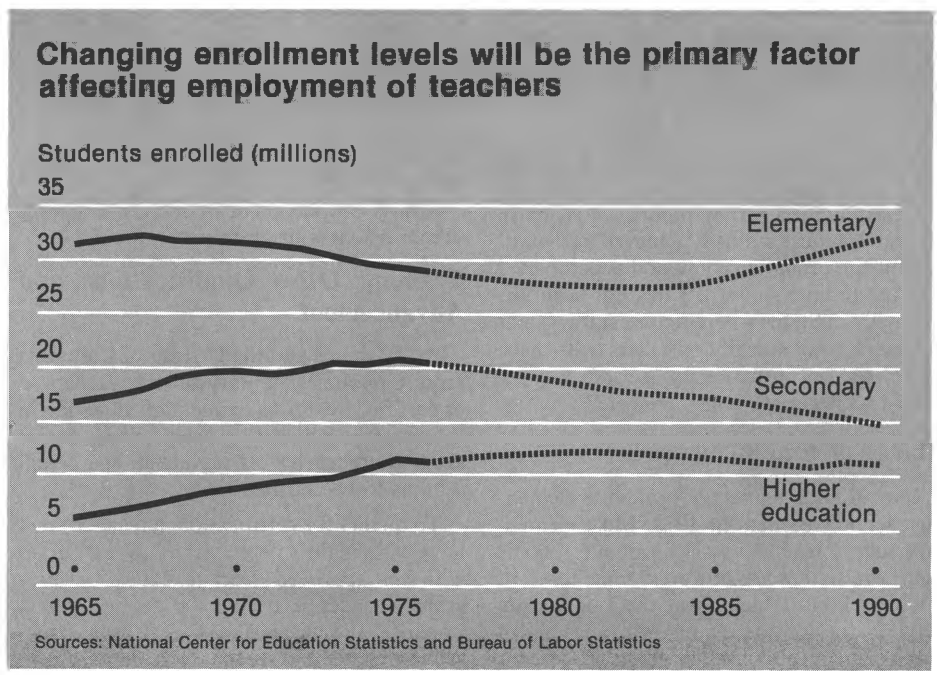
Kindergarten and elementary school teachers play a vital role in the development of children. What is learned or not learned in these early years can, to a large measure, shape students' views of themselves, the world, and the process of education.

Kindergarten and elementary school teachers must introduce children to the basic concepts of mathematics, language, science, and social studies to provide a sound foundation for more advanced study in the higher grades. They also try to instill good study and work habits and an appreciation for learning, while closely watching and evaluating each child's performance and potential.

Elementary school teachers often devise creative means to present specific subject matter. They may use films, slides, computers, or develop instructional games. They also arrange class trips, speakers, and class projects. All of this work takes much time and effort, often after the regular school day.

Teachers also are concerned with the social development and health of their students. They study each child's interactions with classmates and discuss any problems with the parents. Teachers may, for example, meet with the parents of a child who habitually resists authority to discover the cause and work out a solution. Teachers also report any possible health problems to parents and school health officials. The teacher's primary concern is to insure that each child receives as much personalized help as possible.

Most elementary school teachers instruct a single group of children in several subjects. In some schools, two or more teachers team teach and are jointly responsible for a group of students or for a particular subject. An increasing number of elementary school teachers specialize in one or two subjects and teach these subjects to several classes. Some teach special subjects such as music, art, or physical education, while others teach basic subjects such as English, mathematics, or social studies.



outside the classroom. They generally must attend regularly scheduled faculty meetings and may serve on faculty committees, such as those to revise curricula, or to evaluate the school's objectives and the student's performance. Teachers also may supervise after school activities such as glee clubs, drama clubs, or arts and crafts classes. To stay up-to-date on educational materials and teaching techniques, they participate in workshops and other in-service activities and take courses at local colleges and universities.

A growing number of elementary school teachers have aides to do secretarial work and help supervise lunch and playground activities. As a result, teachers can be free from routine duties to give more individual attention to students.

Working Conditions

In addition to hours spent with classes, teachers must spend time preparing lessons, grading papers, making reports, attending meetings, and supervising extracurricular activities. As a result, most teachers end up working well over 40 hours a week. Because the individual needs of each student put many demands on a teacher's time, teaching can be both physically and emotionally exhausting.

In addition to their regular assignments, some elementary school teachers teach summer sessions, take courses, or work at other jobs, such as camp counseling. Most elementary school teachers work a traditional 2-semester, 10-month school year. Some, however, work in year-round schools where they work 8-week sessions, are off 1 week between sessions, and have a longer midwinter break. This type of schedule may make finding additional employment ouside the school system difficult.

Teachers spend much of their time standing, walking, kneeling, or even sitting on the floor. For example, kindergarten teachers may join their students on the floor to finger paint, cut out pictures, or do other crafts.

Employment in teaching is fairly steady. Population trends rather than business conditions affect the market for teachers.

Most States have tenure laws—laws that ensure the jobs of teachers who have taught successfully for a certain number of years. In 25 States, tenure status is achieved automatically if the probationary period is completed and the teacher's contract has not been terminated. In States where tenure status is not achieved automatically, teachers who have completed a probationary period are required to negotiate a new contract.

Places of Employment

Over 1.3 million people worked as elementary school teachers in 1978. Most elementary school teachers work in public schools that have six grades; however, some teach in middle schools which cover the 3 or 4 years between the lower elementary grades and 4 years of high school. Only about 12 percent of elementary school teachers work in nonpublic schools.

Teachers often must give students individual attention.

A large proportion of all public elementary school teachers teach in urban areas.

Training, Other Qualifications, and Advancement

All 50 States and the District of Columbia require public elementary school teachers to be certified by the department of education in the State in which they work. Some States also require teachers in private and parochial schools to be certified.

To qualify for certification, a teacher must have a bachelor's degree from an institution with an approved teacher education program. Besides a bachelor's degree, which provides the necessary liberal arts background, States require that prospective teachers have student-teaching and other education courses. In 1978, 23 States required teachers to have graduate degrees. However, this requirement was often coupled with provisions concerning continuing education.

Thirty States had continuing education requirements for teachers in 1978. Some States required U.S. citizenship; some an oath of allegiance; and several a health certificate. Only one State, Florida, had a residency requirement.

Local school systems sometimes have additional requirements for employment. Students should write to the local superintendent of schools and to the State department of education for information on specific requirements in the area where they want to teach.

In addition to meeting educational and

certification requirements, teachers should be creative, dependable, and patient. Most important, they should want to be directly involved in the educational and emotional development of children. Competence in handling classroom situations also is important.

As a teacher gains experience, he or she may advance within a school system or transfer to another which recognizes experience and has a higher salary scale. Some teachers may advance to supervisory, administrative, or specialized positions. Often, however, these positions require additional training and certification. As a result, for most teachers, advancement consists of higher pay rather than more responsibility or a higher position.

Employment Outlook

Kindgergarten and elementary school teachers may face competition for jobs of their choice through the 1980's. If the pattern continues in line with past trends, the number of persons qualified to teach in elementary schools will approximate the number of openings.

The basic sources of teacher supply are recent college graduates qualified to teach at the elementary level and teachers seeking reentry to the profession. Reentrants, although more experienced, will face increasing competition from new graduates, who command lower salaries and have more recent training.

Pupil enrollment is the basic factor underlying the need for teachers. Because of fewer births in the 1960's, elementary enrollments have been on the decline since 1967, when they peaked at nearly 32 million. The National Center for Education Statistics projects that, by 1983, the downward enrollment trend will halt at a level of 27 million. Thereafter, enrollments will advance to nearly 32 million by 1990.

Teachers will be needed to fill new positions created by larger enrollments; to replace those who are not now certified; to meet the expected pressure for an improved pupil-teacher ratio; and to fill positions vacated by teachers who retire, die, or leave the profession for other reasons.

A decline in the projected number of children born over the next decade could lessen the demand for teachers. While the trend has not been clearly established, since 1970 women have continued to have fewer children, and according to a recent survey, they expect to continue having smaller families than were common 10 years ago. However, the number of births is expected to rise as a result of the growing number of women entering the childbearing years.

Several factors could alter the outlook for teachers. Increased emphasis on early childhood education, on special programs for disadvantaged children, and on individual instruction may result in larger enrollments, smaller student-teacher ratios, and consequently an increased need for teachers. Possible budget contraints, on the other hand, might limit expansion of educational services.

Earnings

According to the National Education Association, public elementary school teachers averaged $14,669 a year in 1978-79. Average earnings in 1978 were about one and one-third times the average earnings for all nonsupervisory workers in private industry, except farming. Generally, States in the Northeast and in the West paid the highest salaries.

Collective bargaining agreements cover an increasingly large number of teachers. In 1978, 31 States had enacted laws that required collective bargaining in teacher contract negotiations. Most public school systems that enroll 1,000 students or more bargain with teacher organizations over wages, hours, and the terms and conditions of employment.

Related Occupations

Kindergarten and elementary school teaching requires a wide variety of skills and aptitudes, including organizational and administrative abilities, a talent for working with children, communication skills, the power to influence, motivate, and train others, recordkeeping expertise, creativity, and leadership ability. Other occupations that make use of some or all of these aptitudes include administrative officers; child care attendants; education and training managers for government or private industry; employment interviewers; encyclopedia research workers; lawyers; librarians; newswriters; personnel managers; public relations representatives; records managers; sales representatives; social workers; and career, vocational, or school counselors.

Sources of Additional Information

Information on schools and certification requirements is available from local school systems and State departments of education.

For information on the Teacher Corps, contact:

Teacher Corps, U.S. Department of Education, 400 Maryland Ave. SW., Washington, D.C. 20202.

Other sources of general information are:

American Federation of Teachers, 11 Dupont Circle, Fifth Floor, Washington, D.C. 20036.

National Education Association, 1201 16th St. NW., Washington, D.C. 20036.

Secondary School Teachers

(D.O.T. 091. except -107)

Nature of the Work

The high school years are the years of transition from childhood to young adulthood. They are the years when students delve more deeply into subject matter introduced in elementary school and learn more about themselves and the world. It is also a time of preparation for their future lives as citizens and jobholders. Secondary school teachers have a direct role in this process.

The primary function of the secondary school teacher is to instruct students in a specific subject, such as English, mathematics, social studies, or science. Within a teacher's specialized subject area, he or she may teach a variety of courses. A social studies teacher, for example, may instruct two 9th grade classes in American History, two 12th grade classes in Contemporary American Problems, and another class in World Geography. For each class, the teacher develops lesson plans, prepares and gives examinations, and arranges other activities, such as a class project to devise an urban redevelopment plan for the city.

Teachers also must design their classroom presentations to meet the individual needs and abilities of their students. They may arrange tutoring for students, or give advanced assignments for highly motivated pupils. Recognizing the needs of each student can be difficult because most teachers conduct five separate classes a day.

Teachers use a variety of instructional materials including films, slides, and computer terminals. They also may arrange for speakers or trips to supplement their classroom lectures, such as a visit to the planetarium after a discussion of the earth's rotation.

Some teachers teach courses, such as welding, auto mechanics, or distributive education, which train students for specific jobs after graduation. These teachers instruct with the actual tools of the trade, whether they be adding machines or an 8-cylinder car engine.

Secondary school teachers also supervise study halls and homerooms, and attend meetings with parents and school personnel. Often they work with student groups outside of class to help solve specific problems. Teachers also participate in workshops and college classes to keep up-to-date on their subject specialty and on current trends in education.

In recent years, teachers have been able to spend more time teaching due to the increased availability of teacher aides who perform secretarial work, grade papers, and do other routine tasks.

Working Conditions

In addition to hours spent with their classes, teachers must spend time preparing lessons, grading papers, making reports, attending meetings, and supervising extracurricular activities. As a result, most teachers end up working well over 40 hours a week.

Teaching involves long periods of standing and talking and can be both physically and

mentally tiring. Dealing with disruptive students can also be emotionally exhausting.

While many teachers work the traditional 10-month school year with a 2-month vacation, some school districts have converted to a year-round schedule. Teachers on this type of schedule may work 8 weeks, be on vacation for 1 week, and have a 5-week midwinter break.

The District of Columbia and most States have tenure laws—laws that ensure the jobs of teachers who have taught successfully for a certain number of years. In 25 States, tenure status is achieved automatically if the probationary period is completed and the teacher's contract has not been terminated. In States where tenure status is not achieved automatically, teachers who have completed a probationary period are required to negotiate a new contract.

Places of Employment

In 1978, more than 1 million teachers taught in secondary schools. More than 90 percent of them taught in public schools. Although they work in all parts of the country, teachers are concentrated in cities and in suburban areas.

According to a recent survey, slightly more than one-half of all public secondary school teachers teach in senior high schools; about one-third teach at the junior high level. About one-tenth teach in junior-senior high schools, and a very small number are elementary-secondary combination teachers.

Training, Other Qualifications, and Advancement

All 50 States and the District of Columbia require public secondary school teachers to be certified. Many States also require certification of secondary teachers in private and parochial schools.

In 1978, 23 States required graduate degrees for initial certification. However, this requirement was often coupled with provisions concerning continuing education. Thirty States required continuing education of teachers in 1978.

The educational requirements for secondary school teachers vary by State and by school system. Approved colleges and universities in every State offer programs that include the education courses and the student-teaching that States require. They also offer the academic courses that are necessary to qualify teachers in the various subject specialties taught at the secondary level.

States and local jurisdictions often have general requirements for teachers, such as the recommendation of the college, a certificate of health, and U.S. citizenship. Prospective teachers may get complete information on educational and general requirements from each State department of education and from the superintendent of schools in each community.

In addition to hours spent in the classroom, teachers must spend time preparing lessons, grading papers, and supervising extracurricular activities.

Aside from educational requirements, a secondary school teacher must want to work with young people, have an interest in a special subject, and have the ability to motivate students and to relate knowledge to them.

Education and experience provide the primary basis for advancement, usually in the form of higher salaries rather than a different job. Advancement to supervisory and administrative positions usually requires at least 1 year of professional education beyond the bachelor's degree and several years of successful classroom teaching. Only a small proportion of secondary school teachers, however, advance to administrative positions.

Some experienced teachers with specific preparation may work as special school service personnel, such as school psychologists, reading specialists, or guidance counselors. Often these jobs require special certification as well as special education.

Employment Outlook

The supply of secondary school teachers through the 1980's will greatly exceed anticipated requirements, if past trends continue. As a result, prospective teachers are likely to face keen competition for jobs.

The prime sources of teacher supply are recent college graduates qualified to teach secondary school and teachers seeking to reenter the profession. Although reentrants have experience in their favor, many schools may prefer to hire new graduates who command lower salaries and whose training is more recent.

Pupil enrollment is the basic factor underlying the demand for teachers. The National Center for Education Statistics projects that enrollment in secondary schools will decline and, in turn, reduce the demand for teachers. As a result, over the 1978-90 period, nearly all teaching positions will stem from the need to replace teachers who die, retire, or leave the profession for other reasons. Thus, an increasing proportion of prospective teachers will have to consider alternatives to secondary school teaching.

Although the overall outlook for secondary teachers indicates a highly competitive market, employment conditions may be more favorable in certain fields. Education of the gifted and talented, special and vocational education, mathematics, natural sciences, and physical sciences should not experience as large an oversupply as some other subjects.

Earnings

According to the National Education Association, public secondary school teachers averaged $15,474 per year in 1979. This is one and one-half times the average for non-

supervisory workers in private industry, except farming. Generally, salaries were higher in the Northeast and in the West than they were in the Southeast and in the Midwestern States.

Collective bargaining agreements cover an increasingly large number of teachers. In 1978, 31 States had enacted laws that required collective bargaining in teacher contract negotiations.

In some schools, teachers receive supplementary pay for such school-related activities as coaching sports and working with students in extracurricular activities, such as music, dramatics, or school publications. Some public school teachers also work in their school systems during the summer. Others hold summer jobs outside the school system.

Related Occupations

Secondary school teaching requires a wide variety of skills and aptitudes, including organizational and administrative talents; research abilities; communication skills; the power to influence, motivate, and train others; recordkeeping expertise; creativity; helpfulness; and leadership ability. Other occupations which make use of some or all of these aptitudes include: Administrative officers; career, vocational, or school counselors; education and training managers for government or private industry; employment interviewers; encyclopedia research workers; lawyers; librarians; newswriters; personnel managers; public relations representatives; records managers; sales representatives; and social workers. Other related occupations include those in the particular subject field in which the teacher is trained.

Sources of Additional Information

Information on schools and certification requirements is available from local school systems and State departments of education.

For information on the Teacher Corps, contact:

Teacher Corps, U.S. Department of Education, 400 Maryland Ave. SW., Washington, D.C. 20202.

Other sources of general information are:

American Federation of Teachers, 11 Dupont Circle, Fifth Floor, Washington, D.C. 20036.

National Education Association, 1201 16th St. NW., Washington, D.C. 20036.

College and University Faculty

(D.O.T. 090.227-010)

Nature of the Work

Each year thousands of Americans enter college. People attend college for a variety of reasons. Some view it primarily as an opportunity for personal enrichment. Many others seek higher education to obtain the skills they need for a job. To meet all these needs, colleges and universities hire faculty to provide instruction in many different subjects.

The primary function of the college or university faculty member is to present an in-depth analysis of a paricular field of study. Many faculty members conduct several different courses in the same field—freshman composition and 18th century English literature, for example. Many instruct undergraduates only, while some instruct both undergraduates and graduate students. Still fewer instruct only graduate students. Usually, the more experienced and educated faculty members conduct the higher level classes.

College and university faculty members use various methods to present information, depending on the subject, interest, and level of their students. Some conduct lectures in classrooms that seat hundreds of students while others lead seminars for only a few students. Still others work primarily in laboratories for subjects such as biology, engineering, or chemistry. Some have the aid of teaching assistants who may lead discussion sections or grade exams. Closed-circuit television, tape recorders, computers, and other teaching aids frequently are used.

College faculty members must keep up with developments in their field by reading current literature, participating in professional activities, and conducting scholarly research. Writing books or journal articles can be very important, and some college faculty members experience a serious conflict between their responsibilities to their students and the pressure to "publish or perish." The importance of research and publication varies, however. Research usually is stressed more at major colleges and universities than at junior and community colleges. A recent survey indicated that as many as one-fourth of the faculty in science and engineering departments that offered doctoral degrees were primarily involved in research and development activities.

In addition to time spent on preparation, instruction, evaluation, and research, college and university faculty members work with student organizations and act as student advisors; work with the college administration; and in other ways serve the institution and the community. Those who are department chairpersons have supervisory and administrative duties.

Working Conditions

College faculty members generally have flexible schedules, dividing their time among teaching, research, and administrative responsibilities. The normal teaching load usually is heavier in junior and community colleges where less emphasis is placed on scholarly research and publication than in major universities.

Over 90 percent of all full-time college and university faculty work in institutions that have tenure systems (the assurance of continuing employment with freedom from dismissal without cause). Over three-fifths of those faculty members are tenured. Under a tenure system, a faculty member usually receives 1-year contracts during a probationary period lasting at least 3 years and ordinarily no more than 7 years; some universities award 2- or 3-year contracts. After the probationary period, institutions consider faculty members for tenure. Due to declining enrollments and budgetary constraints, however, faculty members now find it increasingly difficult to gain tenure. Some colleges and universities are turning more and more to short-term contracts and to part-time faculty members to save money and avoid long-term commitments.

Few professions offer vacation arrangements as attractive as those in college teaching. In addition to summer months during which faculty members may work, travel, study, or pursue hobbies, they also have breaks during other school holidays.

College faculty share in the growth and development of students and are constantly exposed to new ideas. Many persons pursue teaching careers because of the intangible rewards from working in an academic environment.

Places of Employment

In 1978, about 673,000 faculty members worked in about 3,200 colleges and universities. An estimated 441,000 faculty members were full-time senior staff; about 204,000 were part-time senior staff; and 28,000 were full-time junior instructors. In addition, there were thousands of part-time assistant instructors, teaching fellows, teaching assistants, or laboratory assistants who aided these faculty members while studying for their advanced degrees.

Public institutions, which amount to less than one-half of all colleges and universities, employ over 70 percent of all full-time faculty. They employ about two-thirds of the full-time faculty in all universities and 4-year colleges, and over 90 percent in all 2-year institutions.

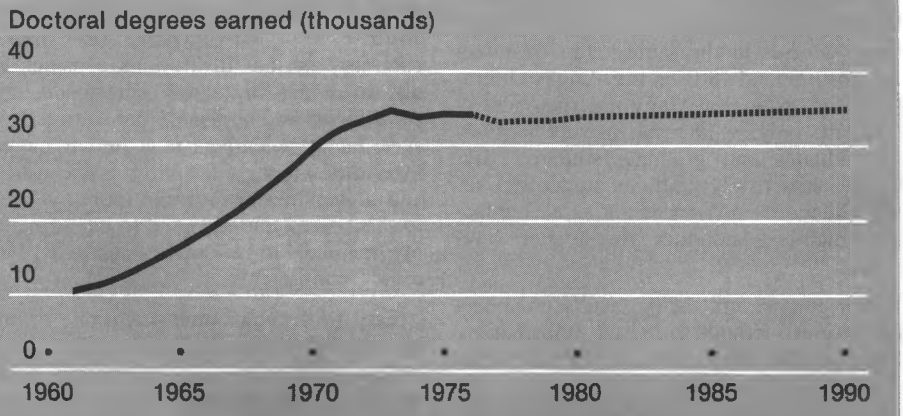
Nearly one-third of full-time faculty teach in universities; almost one-half work in 4-year colleges; and over one-fifth teach in 2-year colleges.

Training, Other Qualifications, and Advancement

The overwhelming majority of full-time college and university faculty are classified in four academic ranks: Instructors, assistant professors, associate professors, and professors. The top three ranks comprise about three-fourths of full-time faculty. A small proportion of faculty are classified as lecturers. Most full-time junior and community college faculty are in institutions that do not use academic ranks.

Most college faculty enter the profession as

The continuing oversupply of doctoral degree holders will create very stiff competition for academic positions



Source: National Center for Education Statistics

In addition to teaching, many college teachers participate in professional activities and research.

instructors and must have at least a master's degree. Because competition for positions is so keen, however, some colleges and universities consider only doctoral degree holders for entry level academic appointments.

Doctoral programs usually require 3-5 years of study beyond the bachelor's degree, including intensive research for a doctoral dissertation which makes an original contribution to the candidate's field of study. A working knowledge of one or more foreign languages and in scientific fields, advanced mathematical and statistical techniques, often is required as well. Students should carefully consider their academic potential and motivation before beginning doctoral studies.

Advancement through the academic ranks usually requires a doctorate plus college teaching experience, even in institutions that hire master's degree holders as instructors. Assistant professors usually have a few years of prior experience as an instructor, while an appointment as associate professor frequently requires 3 years or more of experience as an assistant professor. For a professorship, extensive teaching experience and published books and articles that evidence expertise in one's discipline usually are essential.

Academic, administrative, or professional contributions affect advancement opportunities in this field. Research, publication, consulting work, and other forms of professional recognition all have a bearing on a college faculty member's chances of rising through the academic ranks.

A special zeal for learning and the desire and skill to help others learn are necessary for success. College faculty must have inquiring, analytical minds in order to devote their lives to the pursuit and dissemination of knowledge. Since they function both as teachers and researchers, they must be good at communicating information and ideas both orally and in writing. As models for their students, they must exhibit dedication to the principles of academic integrity and intellectual honesty. College faculty must always be open to new ideas—from their students, their peers, and the nonacademic community.

Employment Outlook

The basic factor underlying the demand for college faculty is enrollment. During the 1960's and most of the 1970's, enrollments rose and employment of college faculty increased. The steady rise in the number of persons attending college reflected not only growth in the number of 18- to 21-year-olds, but an increase in the proportion of college-age persons who actually went to college. In recent years, a growing number of adults have entered college. Although the outlook for college enrollments during the 1980's is uncertain, they are likely to decline. Compared to the recent past, there will be many fewer people of college age, and enrollments by adults are not expected to make up the difference. Fewer students during the 1980's almost certainly would mean some decrease in employment of college faculty over the period.

As a result, job openings for college faculty will result almost entirely from replacement needs. In any given academic institution, the number of vacancies will be influenced by the age of current faculty, tenure patterns and policies, and retirement practices.

Competition for these openings will be extremely keen, particularly for faculty positions in the largest and most outstanding institutions. The number of Ph. D. recipients alone will exceed greatly the number of openings for college faculty through the 1980's. Many graduates who succeed in finding academic jobs may have to accept appointments that offer little or no hope of gaining tenure.

Preference for faculty candidates with a doctorate will continue to be much stronger in 4-year institutions than in 2-year institutions. Because of possible enrollment declines and budgetary constraints, however, some 4-year institutions may find it more economical to hire some new faculty members at the master's degree level. At 2-year institutions, the education and training required for attainment of the doctorate often is not considered advantageous for a person whose primary task will be teaching undergraduates.

Throughout the 1980's, an increasing pro-

portion of prospective college faculty members will have to seek nonacademic jobs. Government and private industry will provide such positions, for the most part. However, some persons holding graduate degrees may find it necessary to enter occupations that have not traditionally required a master's degree or a Ph. D.

Earnings

Earnings vary widely according to faculty rank and type of institution. In general, faculty members in 4-year institutions average higher salaries than those in 2-year schools. According to a 1977-78 survey, salaries for all full-time faculty on 9-month contracts averaged around $18,700; professors, $25,-100; associate professors, $19,000; assistant professors, $15,500; and instructors, $12,-500.

Many institutions pay according to salary schedules determined by rank. On the average, more faculty in public than in private institutions are covered by these schedules. In institutions without schedules, a college senate often determines salaries according to a general set of criteria.

Since almost 90 percent of full-time faculty members have 9-month contracts, many have additional summer earnings from teaching, research, writing for publication, or other employment. Royalties and fees for speaking engagements may provide additional earnings. Some faculty members also undertake additional teaching or research projects or work as consultants.

Some college and university faculty members also may enjoy certain benefits offered by few other professions, including tuition waivers for dependents, housing allowances, travel allowances, and paid leaves of absence. In many institutions, faculty members are eligible for a sabbatical leave after 6 or 7 years of employment.

Related Occupations

College and university faculty assist students in their academic pursuits. Others who assist college students in a variety of ways and whose jobs generally require advanced training include college presidents, deans of students, academic deans, directors of admissions, directors of athletics, financial aid officers, foreign student advisors, college student personnel workers, college career planning and placement counselors, and academic librarians.

Sources of Additional Information

General information on teaching as a career is available from:

American Federation of Teachers, 11 Dupont Circle NW., Washington, D.C. 20036.

Professional societies in the various subject fields will generally provide information on teaching requirements and employment opportunities in their particular fields. Names and addresses of societies are given in the statements on specific professions elsewhere in the *Handbook*.

Technical Writers

(D.O.T. 131.267-026)

Nature of the Work

Technological innovations are being introduced faster than ever. By putting scientific and technical information into language that can readily be understood, technical writers play an important role in our society. They research, write, and edit technical materials and also may produce publications or audiovisual materials. To ensure that their work is accurate, technical writers must be expert in the subject area in which they are writing—laser beams or pharmacology, for example. At the same time, their writing must be clear and easy to follow. Command of the language and versatility of style are tools of the trade that enable technical writers to convey information in a way that is helpful to people who use it—scientists, technicians, executives, sales representatives, and the general public. In addition to their primary function of clarifying technical information, technical writers often are involved in marketing, advertising, and public relations work in which they utilize their writing skills.

Some organizations use job titles other than "technical writer." Depending on the employer, people in technical writing jobs may be called staff writers, publications engineers, communications specialists, industrial writers, medical writers, communicators, or instructional materials developers.

Technical writers set out either to instruct or to inform, and in many instances they do both. They prepare manuals, catalogs, parts lists, and instructional materials needed by the sales representatives who sell machinery or scientific equipment and by the technicians who install, maintain, and service it. Instructional aids must be prepared to assist the people who operate complex equipment—for example, the technicians who monitor sophisticated diagnostic equipment in a hospital's coronary care unit. Writing manuals and training aids for military weapons and equipment is a highly specialized field of technical writing. Sometimes technical writers are asked to write scripts for training films, or to prepare instructional materials for self-teaching cassettes, filmstrips, or kits. Technical writers often are part of a team, working closely with scientists, engineers, accountants, and others.

Many technical writers prepare reports on research. By communicating research developments to other scientists, engineers, and technicians, these reports help prevent duplication of effort and speed scientific and technical progress. Reports also play an important part within a company; hundreds of progress reports may be sent from one department to another within the course of a year. Detailed reports also must be prepared for government regulatory agencies and for agencies that fund research and development projects. Some reports—environmental impact statements, for example—require such a detailed treatment of technical subjects that they usually are prepared by scientists with the assistance of technical writers. Annual reports to stockholders sometimes are an additional responsibility.

Proposal preparation is another important duty of technical writers. Proposals are requests for the money or facilities to conduct a project, develop a prototype of a new product, or do research. When a proposal is being prepared, scientists and engineers provide the technical information, management provides cost estimates, and a team of technical writers usually shapes the final proposal.

Manuals, reports, and proposals make up the bulk of technical writing today; however, the work may take other forms. Technical writers may write specifications; prepare speeches and news releases; edit and write technical books; prepare articles for popular magazines; develop advertising copy, promotional brochures, and texts for exhibits and displays; and handle technical documentation.

Technical writers usually start an assignment by learning as much as they can about the subject. They study reports, blueprints, sketches, drawings, parts lists, specifications, mockups, and product samples to become familiar with product technologies and production methods. They also read technical journals; consult with engineers, scientists, and technicians who have worked on the project; and examine the equipment. After they have assembled as much information as appropriate, given the time they have and the purpose of the document, they draw up an outline. Then they prepare a rough draft, which may undergo several revisions before being accepted in final form. Technical writers usually arrange for the preparation of tables, charts, illustrations, and other artwork that accompany a finished document and may work directly with technical illustrators, drafters, or photographers.

Working Conditions

Most technical writers work for government agencies or private firms, and have structured work schedules. However, they sometimes must work overtime and often are under considerable pressure to meet publication deadlines. Acquiring and assembling needed information and interpreting highly technical data can be stressful. Onsite inspection of new scientific projects and other research may require travel.

Freelance writers set their own hours and often work at home. Well-established writers with high incomes may rent offices. They, too, may work under pressure to meet editors' deadlines. They conduct research in libraries, hospitals, factories, newspaper offices, museums, private homes, or wherever

information is available. Freelance writers may interview people on the street or on public transit. Like other technical writers, self-employed writers must be willing to travel when necessary.

Places of Employment

An estimated 24,000 technical writers and editors were employed in 1978. Many work for large firms in the electronics, aviation, aerospace, ordnance, chemical, pharmaceutical, and computer manufacturing industries. Firms in the energy, communications, and computer software fields employ many technical writers, and research laboratories employ significant numbers. Some laboratories are affiliated with manufacturing companies and concentrate on developing products or improving the manufacturing process. Other research laboratories—including those connected with universities, government agencies, or private foundations—engage in both basic and applied research.

The Federal Government employs about 1,700 technical writers and editors in areas as diverse as the physical sciences, weapons development, agriculture, and health. About three-fourths work for the Department of Defense, writing manuals that keep military personnel informed on the construction, maintenance, and use of weapons and instruments. Many other agencies employ technical writers, including the Departments of Interior; Agriculture; Health, Education, and Welfare; and the National Aeronautics and Space Administration.

Many people in this occupation work directly for publishing houses. They hold writing and editing jobs with business and trade publications; on professional journals in engineering, medicine, physics, chemistry, and other sciences; and with publishers of scientific and technical literature. Technical writers also work in publishing programs in colleges and universities.

Medical writers keep health professionals and the public informed about current developments and discoveries in health and medicine. They work in a wide range of settings including hospitals, drug firms, universities, medical journals and associations, laboratories, publishing houses, public relations firms, and advertising agencies.

The rapidly growing information industry provides another area of employment for technical writers. Commercial firms that provide their clients with access to a computerized data base employ technical information specialists to collect, process, and manage a vast amount of information. Technical writers are particularly well suited for such jobs because of their combination of technical and communications skills. Such jobs also are available at the technical information centers run by major industrial firms and research laboratories.

Established technical writers may work on a freelance basis or open their own agencies or consulting firms. Freelance writers sell their work to publishers, corporations, manufacturing firms, and advertising agencies. They usually are hired to complete specific assignments such as writing about a new product or technique.

Technical writers are employed all over the country but the largest concentrations are in the Northeast, Texas, and California.

Training, Other Qualifications, and Advancement

There are no rigid requirements for entry into the field. As a result, people having a variety of backgrounds find jobs as technical writers. Employers seek people whose educational background, work experience, and personal pursuits indicate that they possess both writing skills and appropriate scientific or technical knowledge. Knowledge of graphics and other aspects of publication production may be helpful in getting a job. An understanding of current trends in communication technology is an asset, and familiarity with computer operations and terminology is increasingly important.

A college degree is helpful, and many employers insist on it. Hiring criteria vary, however. Many employers prefer candidates with a degree in science or engineering plus a minor in English, journalism, or technical communications. Other employers emphasize writing ability and, in turn, look for candidates whose degrees are in journalism, English, or the liberal arts. Depending on their line of business, these employers almost always require course work or practical experience in a specific subject as well—computer science or biochemistry, for example.

Besides having writing skills and scientific or technical expertise, technical writers should be intellectually curious and able to think logically. They must be very accurate in their work and able to organize a mass of detailed material. Persistence and patience are important because getting and assembling information is not always easy. Because they often are part of a team of scientists, engineers, and technicians, they should be able to work with others; this requires tact and a cooperative attitude. Technical writers sometimes work alone for long periods with little or no supervision, so they must also be disciplined about work habits and schedules.

Freelance writers in particular must be self-starters. They must be disciplined, motivated, and good at budgeting both time and money in order to deal with periods when there is too much work—or not enough.

Most technical writers do not enter the occupation directly from college. The majority work initially in other jobs, usually as technicians, scientists, or engineers. Some begin as research assistants, editorial assistants, or trainees in a company's technical information or advertising departments. In time, these people may assume writing duties and develop technical communication skills. When a flair for writing becomes evident, they may seek a technical writing position in the same company or find a writing job elsewhere.

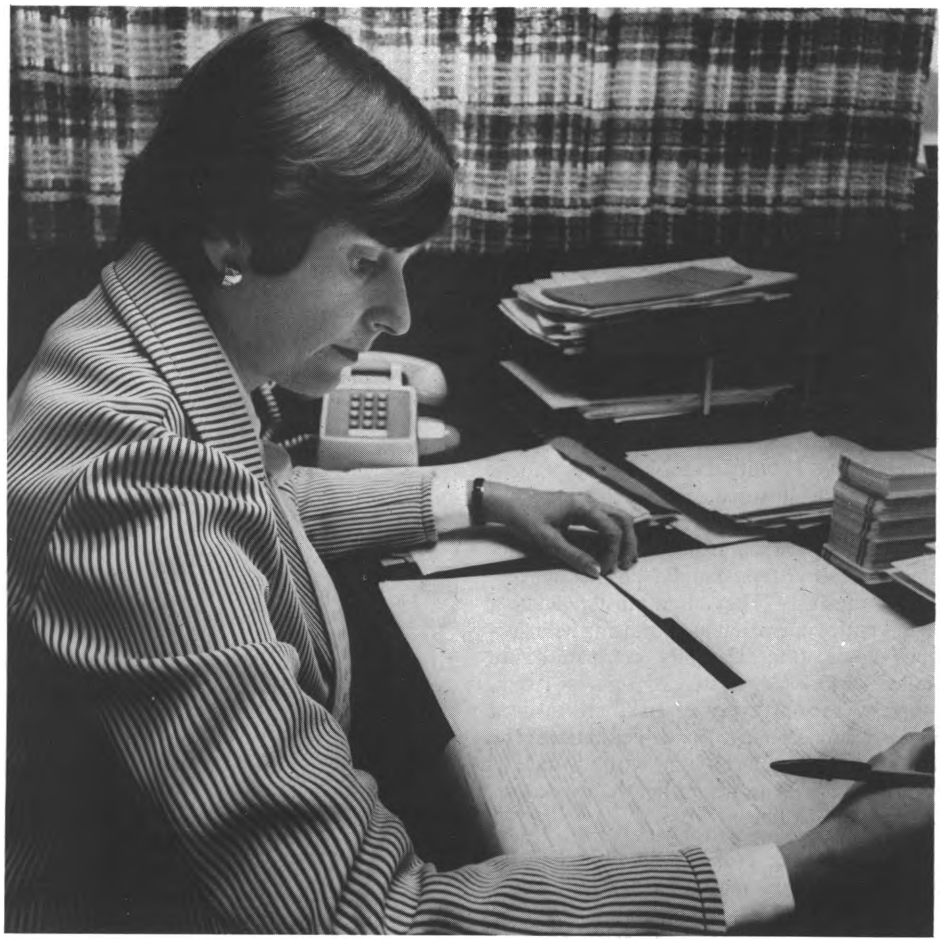
While many employers consider only seasoned, experienced writers in filling vacancies, not all do. Some firms hire college graduates for writer trainee positions. People with solid backgrounds in science or engineering are at an advantage in competing for such jobs. Those with bachelor's or master's degrees in technical writing are often preferred over candidates who have little or no writing background. However, a degree in almost any field may be acceptable, providing the candidate has the necessary technical and communications skills. Beginners can develop experience and demonstrate their ability through writing material for local weekly newspapers and by publishing articles in student or technical journals. A portfolio of writing samples is invaluable when applying for a job.

In 1978, about 10 colleges and universities offered programs leading to a bachelor's degree in technical communication, while fewer had master's degree programs. Several schools offered an associate degree in this field. These programs have various names, including science or medical writing, science information, or technical journalism.

Most undergraduate programs in technical writing are interdisciplinary. While such programs may be based in the communications, journalism, or language and literature departments, they generally are given in close cooperation with the mathematics, engineering, and science departments. At most schools, about 30 percent of the student's course work is in communications. Typical courses include communication theory, writing and editing, layout and design, and graphics. From 25 to 40 percent of the courses are in science or technology. The remainder of the program may be in the social sciences and humanities, or may be devoted entirely to electives. Students usually are advised to take courses in related fields such as computer science and statistics. Knowledge of a foreign language, such as Latin, can be helpful for learning roots of words and for understanding English better. At many schools, internships in industry or government give students in the technical writing program an opportunity for first-hand job experience.

Graduate programs in technical writing emphasize the field of communications. Many graduate students in technical writing already have a bachelor's degree in science, engineering, or technology. Others come from liberal arts backgrounds. A typical graduate program includes courses in the theory of communication, writing and editing, layout and design, technology assessment, and management.

Although only a few schools offer degrees in technical writing or technical illustrating, hundreds of colleges and universities offer one or more courses in these fields. Students with such diverse majors as



Technical writers must possess both strong writing skills and appropriate scientific or technical knowledge.

agriculture, chemistry, engineering, and business administration can elect courses in advanced composition, copy editing, typography, technical advertising, industrial communications, and proposal writing, for example. Many engineering schools offer English courses to sharpen writing skills, and several have developed extensive course offerings in technical writing. Several schools of journalism offer courses in medical journalism.

Numerous special institutes, seminars, and workshops are available to bring technical writers up to date. Some are intensive 1- or 2-week summer seminars sponsored by colleges and universities. Others are workshops run by technical communication consultants or by organizations that specialize in employee training and development.

Beginners often assist experienced technical writers by doing library research and preparing drafts of reports. Experienced writers in companies with large technical writing staffs may move to the job of technical editor or shift to an administrative position in the publications or technical information departments. The top job is that of publications manager, who normally supervises all of the people directly involved in producing the company's technical documents. The manager supervises not only the technical writers and editors, but also the staff responsible for illustrations, photography, reproduction, and distribution.

After gaining experience and contacts, some technical writers freelance or form their own firms. Some consulting firms handle industrial publicity and technical advertising for corporate clients. Other technical communications firms do the actual writing and production of the catalogs, manuals, and brochures that may be needed for the promotion of a new product, for example. Successful technical writers are frequently in demand to conduct writing seminars in industry and government, and some teach at colleges and universities in addition to their regular jobs.

It also is possible to advance by becoming a specialist in a particular scientific or technical subject. These writers sometimes prepare syndicated newspaper columns or articles for popular magazines.

Employment Outlook

Employment of technical writers is expected to increase about as fast as the average for all occupations through the 1980's. In addition to openings due to growth, opportunities will result from the need to replace those who die, retire, or transfer to other occupations. Employment opportunities will be best for experienced technical writers and for beginners who have both demonstrated writing ability and a scientific or technical background. Graduates of technical writing programs should be in particular demand, especially those with backgrounds in areas of growing importance such as computer science, environmental science, and electronics. People who cannot demonstrate both a technical background and communications skills may face stiff competition for beginning jobs.

Demand for technical writers is expected to increase because of the continuing expansion of scientific and technical information and the need to communicate research results to the scientific community as effectively as possible. Also contributing to the demand for technical writers is the growing need to put scientific and technical information into language that corporate managers, sales representatives, and service technicians can understand. With the increasing sophistication and complexity of industrial and scientific equipment, more and more users will depend on the technical writer's ability to prepare explanations and instructions in precise but simple terms. However, the tendency for many scientists and engineers to do their own writing may limit demand for additional technical writers.

Government expenditures for research and development (R & D) will continue to have a significant effect on job opportunities for technical writers. Their employment, like that of scientists and engineers, is linked to spending levels for basic research and for product development in such important areas as national defense, space exploration, energy development and conversion, medicine, environmental health and safety, and communications technology. Through the 1980's, R & D expenditures are expected to increase, but growth will be slower than it was during the peak period of the 1960's.

Relatively few job openings are expected in the Federal Government. The number of technical writers and editors employed by Federal agencies has remained about the same since the late 1960's, and most vacancies will occur as these employees retire or transfer to other jobs.

Earnings

Salaries depend not only on the amount and kind of education a technical writer has, but also on experience and the ability to produce. The type, size, and location of the employer also are important. Earnings generally are higher on the East Coast and in California than in other parts of the country. Freelancing can be an important source of additional income, but freelance earnings vary greatly because they depend on the writer's ability and reputation. Prospective full-time freelance writers should be able to support themselves until they establish contacts in the publishing world and receive regular assignments.

Starting salaries for technical writers ranged from $8,000 to $10,000 a year to as much as $18,000 to $19,000 a year for some

graduates of master's degree programs in 1978, based on the limited information available. Experienced technical writers and editors earned $20,000 to $25,000 a year or more, depending upon their level of responsibility.

In the Federal Government in 1979, beginning technical writers with a bachelor's degree, including 15 semester hours in technical fields such as science, engineering, or computer science, were paid $10,507 a year; those with superior academic records or 1 year's specialized experience could start at $13,014 a year. In 1978, the average salary for technical writers in Federal agencies was around $21,500.

Related Occupations

Technical writers must make their writing clear and meaningful to their audiences. Other occupations in which writing ability is essential include specification writers, journalists, translators, advertising copy writers, public relations workers, educational writers, fiction writers, biographers, and screen writers.

Sources of Additional Information

For information on careers in technical writing and illustrating, contact:

Society for Technical Communication, Inc., Suite 506, 815 15th St. NW., Washington D.C. 20005. *Academic Programs in Technical Communication* , a listing of colleges and universities that offer programs in technical writing, is available from the Society for $6.

For information on careers in business communication, contact:

American Business Communication Association, c/o University of Illinois, 911 South 6th St., Champaign, Ill. 61820.

Underwriters

(D.O.T. 169.167-058)

Nature of the Work

Insurance companies assume millions of dollars in risks each year by transferring the chance of loss from their policyholders to themselves. Underwriters appraise and select the risks their company will insure. (The term underwriter sometimes is used in referring to insurance agents; see the statement on insurance agents and brokers elsewhere in the *Handbook* for a discussion of that occupation.)

Underwriters decide whether their companies will accept risks after analyzing information in insurance applications, reports from loss control consultants, medical reports, and actuarial studies (reports that describe the probability of insured loss). Because these decisions seldom are reviewed at a higher level, underwriters have great responsibility. Their companies may lose business to competitors if they appraise risks too conservatively or may have to pay more claims if their underwriting actions are too liberal.

When deciding that a policy is an acceptable risk, an underwriter may outline the terms of the contract, including the amount of the premium. Underwriters frequently correspond with policyholders, agents, and managers about policy cancellations or to fill requests for information. In addition, they sometimes accompany salespeople on appointments with prospective customers.

Most underwriters specialize in one of three major categories of insurance: Life, property and liability, or health. They further specialize in group or individual policies. The property and liability underwriter specializes by type of risk insured, such as fire, automobile, marine, or workers' compensation. Some underwriters, called commercial account underwriters, handle business insurance exclusively. They often must evaluate a firm's entire operation in appraising its insurance application. Casualty companies are doing more "package" underwriting, whereby various types of risks are insured under a single policy. In such situations, the underwriter must be familiar with several different lines of insurance rather than specializing in a single line.

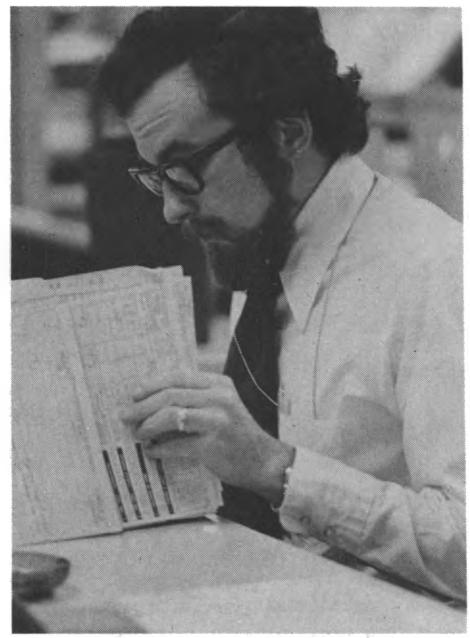
An increasing proportion of total insurance sales is being made through group contracts. A standard group insurance policy insures all persons in a specified group through a single contract at uniform premium rates; this type of group policy generally provides life or health insurance protection. The group underwriter analyzes the overall composition of the group to be sure that total risk is not excessive. A different type of group policy that has gained widespread acceptance is the policy that provides the members of a group —a labor union, for example—with individual policies geared to their own circumstances. These policies generally are in the casualty field, covering automobiles, pleasure boats, and homes. The casualty underwriter analyzes the application of each group member and makes individual appraisals. Some group underwriters attend meetings with union or employer representatives to discuss the types of policies available to their groups.

Working Conditions

Underwriters have desk jobs that require no unusual physical activity. Their offices generally are comfortable and pleasant. Although some overtime may be required, the normal workweek is 35-40 hours. Underwriters occasionally may be away from home for several days while attending meetings.

Places of Employment

An estimated 28,000 persons worked as insurance underwriters in 1978. Over three-fourths were property and liability underwriters working in regional or home offices throughout the United States; most life insurance underwriters were in home offices in a few large cities, such as New York, San Francisco, Chicago, Dallas, and Philadelphia.



To assure an accurate appraisal of risk, underwriters carefully review applications.

Training, Other Qualifications, and Advancement

For beginning underwriting jobs, most large insurance companies seek college graduates who have a degree in liberal arts or business administration, but a major in almost any field provides a good general background. Some small companies hire persons without a college degree for underwriter trainee positions. In addition, some high school graduates who begin as underwriting clerks may be trained as underwriters after they demonstrate an aptitude for the work.

Underwriter trainees begin by evaluating routine applicants under the close supervision of an experienced risk appraiser. They study claim files to become familiar with factors associated with certain types of losses. As they develop the sound judgment that is required, they are assigned policy applications that are more complex and have a greater face value.

Continuing education is a necessity if the underwriter expects to advance to senior level positions. Insurance companies generally place great emphasis on completion of one or more of the recognized independent study programs. Many companies pay tuition and the cost of books for those who satisfactorily complete underwriting courses; some offer salary increases as an additional incentive. Independent study programs are available through the American Institute of Property and Liability Underwriters, the American College of Life Underwriters, the Academy of Life Underwriters, the Health Insurance Association of America, and the Life Office Management Association. As underwriters gain experience, they can qualify as a 'fellow" of the Academy of Life Under-

writers by passing a series of examinations and completing a paper on a topic in the underwriting field. Examinations are given by the Institute of Home Office Underwriters and the Home Office Life Underwriters Association. Designation as a "fellow" is recognized as a mark of achievement in the underwriting field.

Underwriting can be a satisfying career for persons who like working with detail and enjoy evaluating information. In addition to analyzing problems, underwriters must make prompt decisions and be able to communicate their ideas effectively. They must also be imaginative and aggressive, especially when they have to get additional information from outside sources.

Experienced underwriters who complete courses of study may advance to chief underwriter or underwriting manager. Some underwriting managers are promoted to senior managerial jobs after several years.

Employment Outlook

Employment of underwriters is expected to rise faster than the average for all occupations through the 1980's as insurance sales continue to expand. Each year many jobs will become available as the need for underwriters grows and as those who die, retire, or transfer to other work are replaced.

Several factors underlie the expected growth in the volume of insurance and the resulting need for underwriters. Over the next decade, a much larger portion of our population will enter their most productive years. As this traditional market for life insurance expands, the volume of life insurance sales is expected to rise to protect families' standards of living, finance children's education, and provide retirement income. Property and liability insurance sales also should expand as purchases of automobiles, pleasure boats, and other consumer durables increase. Both spending for new home construction and the American public's growing security consciousness should contribute to demand for more extensive insurance protection. New or expanding businesses will need protection for new plants and equipment and insurance for workers' compensation and product liability. Heightened competition among insurance companies and changes in regulations affecting investment profits also are expected to increase the insurance industry's need for competent underwriters.

Earnings

Underwriters in life insurance who had 2 to 4 years' experience averaged about $14,000 a year in 1978, according to a Life Office Management Association (LOMA) survey. Senior life underwriters (those with 5 to 8 years' experience) averaged $18,600, while senior group underwriters earned average salaries of $18,700. Supervisors of underwriting in life insurance companies averaged $17,670 to $23,860. In most cases, underwriters in larger companies earned higher salaries.

A survey of companies that sell property and liability insurance showed that underwriters with 2 to 4 years' experience averaged $14,800 a year in 1978. Earnings varied substantially by underwriting specialty, however: personal lines underwriters earned average salaries of $12,800, while those specializing in surety bonds averaged $15,600. Senior underwriters earned substantially higher incomes—personal lines underwriters averaged $17,300 while those specializing in commercial lines received an average of $13,600 a year. Experienced underwriters earn about one and one-half times the average earnings of nonsupervisory workers in private industry, except farming. Underwriting supervisors in property and liability companies averaged about $19,700 a year in 1978.

Most insurance companies have liberal vacation policies and other employee benefits.

Related Occupations

Underwriters make important decisions on the basis of financial data. Other workers with the same type of responsibility include auditors, loan officers, credit managers, and real estate appraisers.

Sources of Additional Information

General information about a career as an insurance underwriter is available from the home offices of many life insurance and property and liability insurance companies. Information about career opportunities as an underwriter also may be obtained from:

American Council of Life Insurance, 1850 K St. NW., Washington, D.C. 20006.

Insurance Information Institute, 110 William St., New York, N.Y. 10038.

Alliance of American Insurers, 1776 F St. NW., Suite 504, Washington, D.C. 20006.

The National Association of Independent Insurers, Public Relations Department, 2600 River Rd., Des Plaines, Ill. 60018.

Urban and Regional Planners

(D.O.T. 199.167-014)

Nature of the Work

Urban and regional planners, often called community or city planners, develop programs to provide for future growth and revitalization of urban, suburban, and rural communities. They help local officials make decisions to solve social, economic, and environmental problems.

Planners examine community facilities such as health clinics and schools to be sure these facilities can meet the demands placed upon them. They also keep abreast of the legal issues involved in community development or redevelopment and changes in housing and building codes. Because suburban growth has increased the need for better ways of traveling to the urban center, the planner's job often includes designing new transportation and parking facilities.

Urban and regional planners prepare for situations or needs that are likely to develop as a result of population growth or social and economic change. They estimate, for example, the community's long-range needs for housing, transportation, and business and industrial sites. Working within a framework set by the community government, they analyze and propose alternative ways to achieve more efficient and attractive urban areas.

Before preparing plans for long-range community development, urban and regional planners prepare detailed studies that show the current use of land for residential, business, and community purposes. These reports present information such as the arrangement of streets, highways, and water and sewer lines, and the location of schools, libraries, and playgrounds. They also provide information on the types of industries in the community, characteristics of the population, and employment and economic trends. With this information, urban and regional planners propose ways of using undeveloped land and design the layout of recommended buildings and other facilities such as subways. They also prepare materials that show how their programs can be carried out and the approximate costs.

Urban and regional planners often confer with private land developers, civic leaders, and officials of public agencies that do specialized planning. They may prepare materials for community relations programs, speak at civic meetings, and appear before legislative committees to explain and defend their proposals.

In small organizations, planners must be able to do several kinds of work. In large organizations, planners usually specialize in areas such as physical design, community relations, or the reconstruction of rundown business districts.

Working Conditions

Like other administrative workers, urban and regional planners spend most of their time in offices behind desks. To be familar with areas that they are developing, however, they occasionally must spend time outdoors examining the features of the land under consideration for development, its current use, and the types of structures existing on it. Planners rarely work outdoors in bad weather, however. Although most planners have a scheduled 40-hour workweek, they sometimes must attend evening or weekend meetings or public hearings with citizens' groups.

Places of Employment

About 17,000 persons were urban and regional planners in 1978. Most work for city, county, or regional planning agencies. A growing number are employed by States or by the Federal Government in agencies deal-

Urban and regional planners map current and proposed future land uses when planning community growth.

ing with housing, transportation, or environmental protection.

Many planners do consulting work, either part time in addition to a regular job, or full time for a firm that provides services to private developers or government agencies. Planners also work for large land developers or research organizations and teach in colleges and universities.

Training, Other Qualifications, and Advancement

Employers often seek workers who have advanced training in urban or regional planning. Most entry jobs in Federal, State, and local government agencies require 2 years of graduate study in urban or regional planning, or the equivalent in work experience. Although the master's degree in planning is the usual requirement at the entry level, some people who have a bachelor's degree in city planning, architecture, landscape architecture, or engineering may qualify for beginning positions.

In 1978, over 70 colleges and universities gave a master's degree in urban or regional planning. Although students holding a bachelor's degree in architecture or engineering may earn a master's degree after 1 year, most graduate programs in planning require 2 or 3 years. Graduate students spend considerable time in workshops or laboratory courses learning to analyze and solve urban and regional planning problems, and often are required to work in a planning office part time or during the summer.

Candidates for jobs in Federal, State, and local government agencies usually must pass civil service examinations to become eligible for appointment.

Planners must think in terms of spatial relationships and visualize the effects of their plans and designs. They should be flexible and able to reconcile different viewpoints to achieve constructive policy recommendations.

After a few years' experience, urban and regional planners may advance to assignments requiring a high degree of independent judgment, such as outlining proposed studies, designing the physical layout of a large development, or recommending policy, program, and budget options. Some are promoted to jobs as planning directors, and spend a great deal of time meeting with officials in other organizations, speaking to civic groups, and supervising other professionals. Further advancement is more difficult at this level and often may only occur through a transfer to a large city, where the problems are more complex and the responsibilities greater.

Employment Outlook

Employment of urban and regional planners is expected to grow faster than the average for all occupations through the 1980's. Land-use planning activities are expected to increase in suburban and nonmetropolitan areas as populations grow. Opportunities also are expected to arise in fields, such as environmental or economic development planning in which planners have not been employed traditionally. In addition, some jobs will open up because of the need to replace planners who will die, retire, or transfer to other occupations.

In recent years, qualified applicants have exceeded openings in urban or regional planning, and the situation is expected to persist unless fewer degrees are awarded through the 1980's than in recent years. As a result, some persons trained as planners will have to accept jobs in other areas of public administration.

Earnings

Urban and regional planners earned a median salary of about $20,500 a year in early 1978—about twice as much as the average earnings for all nonsupervisory workers in private industry, except farming. Planners with master's degrees in urban or regional planning started at about $13,500 a year in early 1978. Planners with a master's degree were hired by the Federal Government at $15,920 a year in early 1979. In some cases, persons having less than 2 years of graduate work could enter Federal service as interns at yearly salaries of either $10,507 or $13,014. Salaries of urban and regional planners employed by the Federal Government averaged $27,450 a year in early 1979.

State governments paid urban and regional planners average beginning salaries of about $12,150 a year in mid-1978, although planners started at more than $14,000 in some States. Salaries of experienced State planners ranged from an average minimum of nearly $17,700 a year to an average maximum of more than $23,500 a year. Salaries of State planning directors ranged from an average minimum of about $26,000 to an average maximum of nearly $32,000 in mid-1978.

City, county, and other local governments paid urban and regional planners median salaries of more than $19,000 a year in early 1978. Planning directors earned median salaries of more than $23,000 a year. Most planners have sick leave and vacation benefits and are covered by retirement and health plans.

Related Occupations

Urban and regional planners develop plans for the orderly growth of urban and rural communities. A number of related occupations also engage in planning. Architects plan and design buildings for construction or alteration. Landscape architects lay out parcels of land for development or recreation. City managers plan and administer community public services. Planning engineers design industrial plants for maximum efficiency. Transportation planning engineers plan transportation systems.

Sources of Additional Information

Facts about careers in planning and a list of schools offering training and job referrals are available from:

American Planning Association, 1313 East 60th St., Chicago, Ill. 60637.

Veterinarians

(D.O.T. 073. except .361-010)

Nature of the Work

Veterinarians (doctors of veterinary medicine) diagnose, treat, and control diseases and injuries among animals. They help prevent the outbreak and spread of animal diseases, many of which can be transmitted to human beings.

Veterinarians treat animals in hospitals and clinics or on farms and ranches. They perform surgery on sick and injured animals and prescribe and administer drugs, medicines, and vaccines.

Veterinary medicine offers a variety of practice specialties. Over one-third of all veterinarians treat small animals or pets exclusively. About one-third treat both large and small animals. A large number specialize in the health and breeding of cattle, poultry, sheep, swine, or horses. Many veterinarians inspect meat, poultry, and other foods as part of Federal and State public health programs. Still others teach in veterinary colleges, do research related to animal diseases, foods, and drugs, or work as part of a medical research team to learn about prevention and treatment of human disease.

Working Conditions

Veterinarians sometimes may be exposed to danger of injury, disease, and infection. Those in private practice often have long and irregular working hours. Veterinarians in rural areas may have to work outdoors in all kinds of weather. Because they are self-employed, veterinarians in private practice usually can continue working well beyond normal retirement age.

Places of Employment

There were about 33,500 veterinarians active in 1978—most in private practice. The Federal Government employed about 2,450 veterinarians, chiefly in the U.S. Department of Agriculture and the U.S. Public Health Service. About 675 more were commissioned officers in the veterinary services of the Army and Air Force. Other employers of veterinarians are State and local government agencies, international health agencies, colleges of veterinary medicine, medical schools, research and development laboratories, large livestock farms, animal food companies, and pharmaceutical companies that manufacture drugs.

Veterinarians are located in all parts of the country, and the type of practice generally varies according to geographic setting. Veterinarians in rural areas mainly treat farm animals; those in small towns usually engage in general practice; those in cities and suburban areas often limit their practice to pets.

Training, Other Qualifications, and Advancement

All States and the District of Columbia require veterinarians to have a license. To obtain a license, applicants must have a Doctor of Veterinary Medicine (D.V.M. or V.M.D.) degree from an accredited college of veterinary medicine and pass written and—in 29 States—oral State board proficiency examinations. Some States issue licenses without further examination to veterinarians already licensed by another State.

For positions in research and teaching, an additional master's or Ph. D. degree usually is required in a field such as pathology, physiology, or bacteriology.

The D.V.M. or V.M.D. degree requires a minimum of 6 years of college consisting of a 4-year professional degree program, preceded by at least 2 years of preveterinary study that emphasizes the physical and biological sciences. Several veterinary medical colleges require 3 years of preveterinary work, however, and most applicants have completed 3 to 4 years of college before entering the professional programs. In addition to rigorous academic instruction, professional training includes considerable practical experience in diagnosing and treating animal diseases, performing surgery, and performing laboratory work in anatomy, biochemistry, and other scientific and medical subjects.

In 1978, there were 22 colleges of veterinary medicine accredited by the Council on Education of the American Veterinary Medical Association. Admission to these schools is highly competitive. Each year there are many more qualified applicants than the schools can accept. Serious applicants usually need grades of "B" or better, especially in science courses. Experience in part-time or summer jobs working with animals is advantageous. Colleges usually give preference to residents of the State in which the college is located, because these schools are largely State supported. In the South and West, regional educational plans permit cooperating States without veterinary schools to send students to designated regional schools. In other areas, colleges that accept a certain number of students from other States usually give priority to applicants from nearby States that do not have veterinary schools.

Federal funds provide a limited number of loans for students who want to pursue full-time study leading to the degree of Doctor of Veterinary Medicine.

Most veterinarians begin as employees or partners in established practices. A few start their own practices with a modest financial investment in drugs, instruments, and an automobile. With a more substantial investment, one may open an animal hospital or purchase an established practice.

Newly qualified veterinarians may enter the Army or Air Force as commissioned officers, or qualify for Federal positions as meat and poultry inspectors, disease-control workers, epidemiologists, research assistants, or commissioned officers in the U.S. Public Health Service. A license is not required for Federal employment.

Employment Outlook

Veterinary employment is expected to grow faster than the average for all occupations through the 1980's, primarily because of growth in the companion animal (horses, dogs, and other pets) population. Emphasis on scientific methods of raising and breeding livestock and poultry and growth in public health and disease control programs also will contribute to the demand for veterinarians. Between 1970 and 1990, however, the number of graduates from schools of veterinary medicine is expected to double. As a result,

Over one-third of all veterinarians treat small animals or pets.

new veterinarians may face competition in establishing practices in some areas.

Earnings

Newly graduated veterinarians employed by the Federal Government started at $18,000 a year in 1979. The average annual salary of veterinarians in the Federal Government was $27,300 in 1978. The incomes of veterinarians in private practice vary considerably, depending on factors such as location, type of practice, and years of experience, but usually are higher than those of other veterinarians. According to the limited data available, the average income of private practitioners was almost $33,000 in 1978.

Related Occupations

Veterinarians work to prevent, diagnose, and treat animal diseases, disorders, and injuries. Other occupations that require similar skills include audiologists, chiropractors, dentists, optometrists, osteopathic physicians, physicians, podiatrists, and speech pathologists.

Sources of Additional Information

A pamphlet entitled *Today's Veterinarian* presents additional information on veterinary medicine as a career, as well as a list of colleges of veterinary medicine. A free copy may be obtained by submitting a request, together with a self-addressed stamped business size envelope, to:

American Veterinary Medical Association, 930 N. Meacham Rd., Schaumburg, Ill. 60196.

Information on opportunities for veterinarians in the U.S. Department of Agriculture is available from:

Animal and Plant Health Inspection Service, Personnel Division, 123 E. Grant St., Minneapolis, Minn. 55403

Food Safety and Quality Service, Personnel Director, 123 E. Grant St., Minneapolis, Minn. 55403.

Students seeking loan or scholarship assistance should send inquiries to the schools in which they are interested.

Wholesale Trade Sales Workers

(D.O.T. 260 through 279.357)

Nature of the Work

Sales workers in wholesale trade play an important role in moving goods from the factory to the consumer. Each sales worker may represent a wholesaler that distributes hundreds of similar products. A wholesale drug company, for example, may stock its warehouse with many brands of drugs, soap, and cosmetics to supply stores that sell directly to the consumer. Likewise, a wholesale building materials distributor sells hardware and construction materials to builders who would otherwise have to deal with many manufacturers.

At regular intervals, sales workers visit buyers for retail, industrial, and commercial firms, as well as buyers for institutions such as schools and hospitals. They show samples, pictures, or catalogs that list the items which their company stocks. Sales workers seldom urge customers to purchase any particular product, since they handle a large number of items. Instead, they offer prompt, dependable service so buyers will become regular customers.

Wholesale sales workers perform many important services for retailers, such as checking the store's stock and ordering items that will be needed before the next visit. Some wholesale sales workers help store personnel improve and update systems for ordering and inventory. In addition, they often advise retailers about advertising, pricing, and arranging window and counter displays. A sales worker who handles specialized products, such as air-conditioning equipment, may give technical assistance on installation and maintenance.

Sales workers do some recordkeeping and attend to other details. They must forward orders to their wholesale houses, prepare reports and expense accounts, plan work schedules, draw up lists of prospects, make appointments, and study literature relating to their products. Some collect money for their companies.

Working Conditions

Sales workers often have long, irregular work hours. Although they call on customers during business hours, they may travel at night or on weekends to meet their schedules. However, most sales workers seldom are away from home for more than a few days at a time. They may spend evenings writing reports and orders, may carry heavy catalogs and sample cases, and be on their feet for long periods.

Places of Employment

About 840,000 persons were employed as wholesale sales workers in 1978. Wholesale houses usually are located in cities, but sales workers may be assigned territories in any part of the country. Their territory may cover a small section of a city having many retail stores and industrial users; in less populated regions it may cover half a State or more.

Firms selling machinery and building materials to industrial and business users are leading employers of wholesale sales workers. Other large employers are companies that sell food products. Wholesalers dealing in drugs, dry goods and apparel, motor vehicle equipment, and electrical appliances employ many sales workers as well.

Training, Other Qualifications, and Advancement

The background a sales worker needs depends mainly upon the product line and the market. Selling certain products requires technical training. Drug wholesalers, for example, must know the names and characteristics of the pharmaceutical products they sell. A background in chemistry, biology, or pharmacy would prove useful, if not indispensable. In other product lines, such as food, familiarity with manufacturers and brands becomes much more important than knowledge about the product itself.

Product knowledge is also important when the sales person seeks to stimulate demand. Someone selling electrical machinery to industrial firms, for example, might suggest ways in which new equipment could improve the customer's productivity and cut costs. To discuss the potential applications of a new piece of equipment requires knowledge of that product as well as an understanding of the way the customer's business operates.

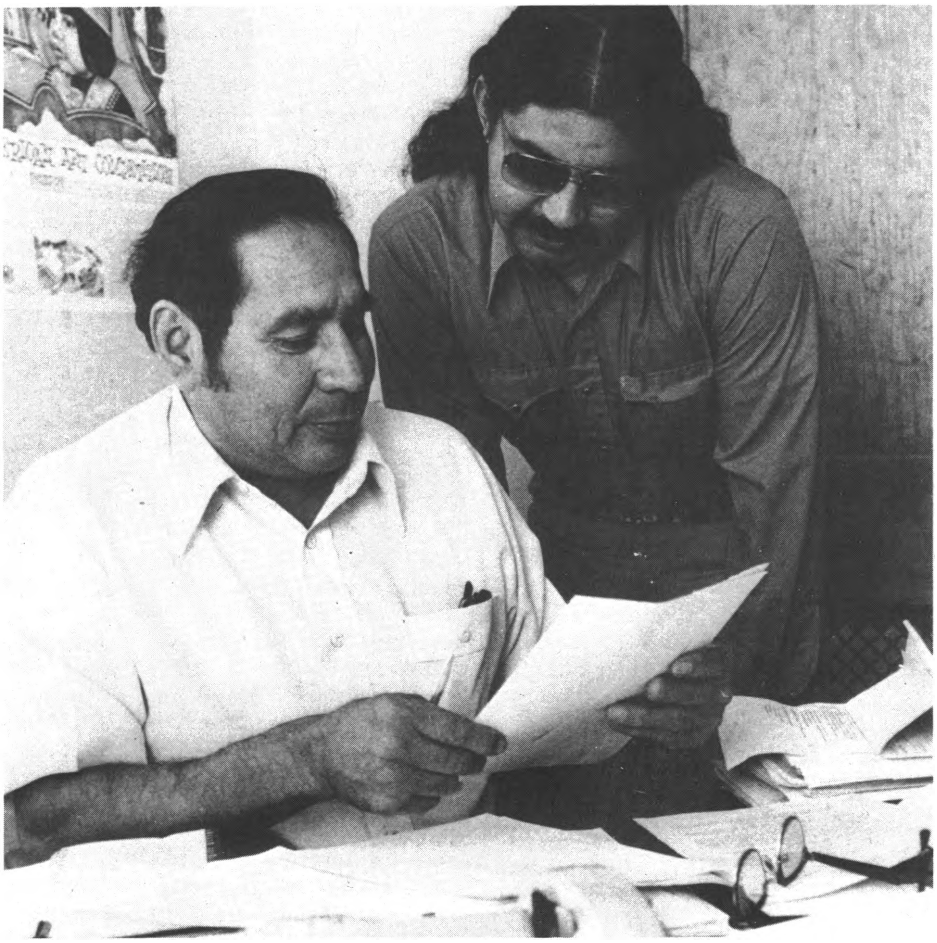
Most wholesale sales workers get their jobs in one of two ways—working up the ladder or transferring in with the appropriate background. High school graduates may begin a career with a wholesale firm in a nonselling job or may be hired as a sales trainee. In either case, beginners usually work in several kinds of nonselling jobs before being assigned to sales. They may start in the stockroom or shipping department to become familiar with the thousands of items the wholesaler carries. Later they may learn the prices of articles and discount rates for goods sold in quantities. Next, they are likely to work on "inside" sales, writing telephone orders. Later, as they accompany an experienced sales worker on calls, trainees come to know some of the firm's customers. The time spent in these initial jobs varies among companies, but usually it takes 2 years or longer to prepare trainees for outside selling.

As professionalism grows in wholesale trade and as products become increasingly complex, more and more college graduates enter the sales force directly out of school. Competent sales workers also transfer from manufacturing and retail trade sales positions. Their experience with a particular product line gives them an advantage over the newcomers to the field.

Sales trainees in very large wholesale firms participate in formal training programs that combine classroom instruction with short rotations in various nonselling jobs. Most firms, however, have no formal program. Their trainees learn by observing and trying the different aspects of the work. As they become familiar with customers and procedures, they gradually take on the full responsibility of the job.

Sales workers sometimes can augment their on-the-job training with outside programs. While only a few colleges offer courses relevant to wholesale distribution, the number is expected to increase. Trade associations sponsor training programs to fill this need. Vendors, too, hold sessions, usually to instruct sales people how best to sell a particular product line.

Experienced sales workers who have lead-



Sales workers must study the literature relating to their products.

ership qualities and sales ability may advance to supervisor, sales manager, or other executive positions.

Employment Outlook

Employment opportunities for sales workers in wholesale trade are expected to be good for those with product knowledge and selling ability. In addition to new positions created by growth, many openings will stem from turnover, which is fairly high in this occupation. Success in selling greatly depends on the ability to locate new customers and persuade them to buy. A number of new sales workers find they are not suited to the competitive nature of selling and leave the occupation.

The number of wholesale sales workers is expected to grow about as fast as the average for all occupations through the 1980's. Businesses and institutions will require a wide variety of products for their own use and for eventual resale. Although many large purchasers and others who require highly specialized products will buy directly from manufacturers, the majority of transactions will involve the wholesale distributor.

As chainstores and other large firms centralize purchasing activities, the value of the sales made to individual customers becomes larger and competition for sales correspondingly greater. Wholesalers can be expected to meet this competition by emphasizing customer services and increasing the size of their sales forces.

Earnings

According to limited information, most beginning sales workers earned around $11,000 a year in 1978. Experienced sales workers earned considerably more. Since commissions often make up a large proportion of the sales worker's income, earnings vary widely in this occupation. They also depend on the sales worker's experience and seniority, as well as on the product line. Median earnings of the lowest paid sales workers in 1978 varied from $14,700 in electrical and electronics goods to $18,000 in the nondurable goods sector. Median earnings of the highest paid sales workers ranged from $27,800 in food products to over $53,000 in paper and paper products.

Compensation plans differ among firms. Many employers pay a salary plus a percentage commission on sales; others pay a straight commission or straight salary. Some include a bonus. Although most wholesale sales workers have steady, year-round work, sales (and commissions) vary because demand for some products—for example, air-conditioning—is greater during certain seasons. To provide sales workers with a steady income, many companies pay experienced personnel a "draw" against annual commissions. Most companies furnish cars or allowances for cars and reimbursements for certain expenses on the road.

Depending on length of service, most sales workers have a 2- to 4-week paid vacation. Many are covered by company benefits, including health and life insurance and retirement pensions.

Related Occupations

In addition to a knowledge of sales techniques, wholesale trade sales workers often are required to have a knowledge of hundreds of similar products. Frequently, sales workers become involved in promoting the use of products. Some occupations that utilize these same skills are buyers, sales-service promoters, manufacturing sales workers, field contact technicians, and demonstrators.

Sources of Additional Information

Information on jobs in wholesale selling may be obtained directly from local wholesale houses or from associations of wholesalers in many of the larger cities. If no local association is available, write to:

Sales and Marketing Executives International, Career Education Division, 380 Lexington Ave., New York, N.Y. 10017.

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Bureau of Labor Statistics
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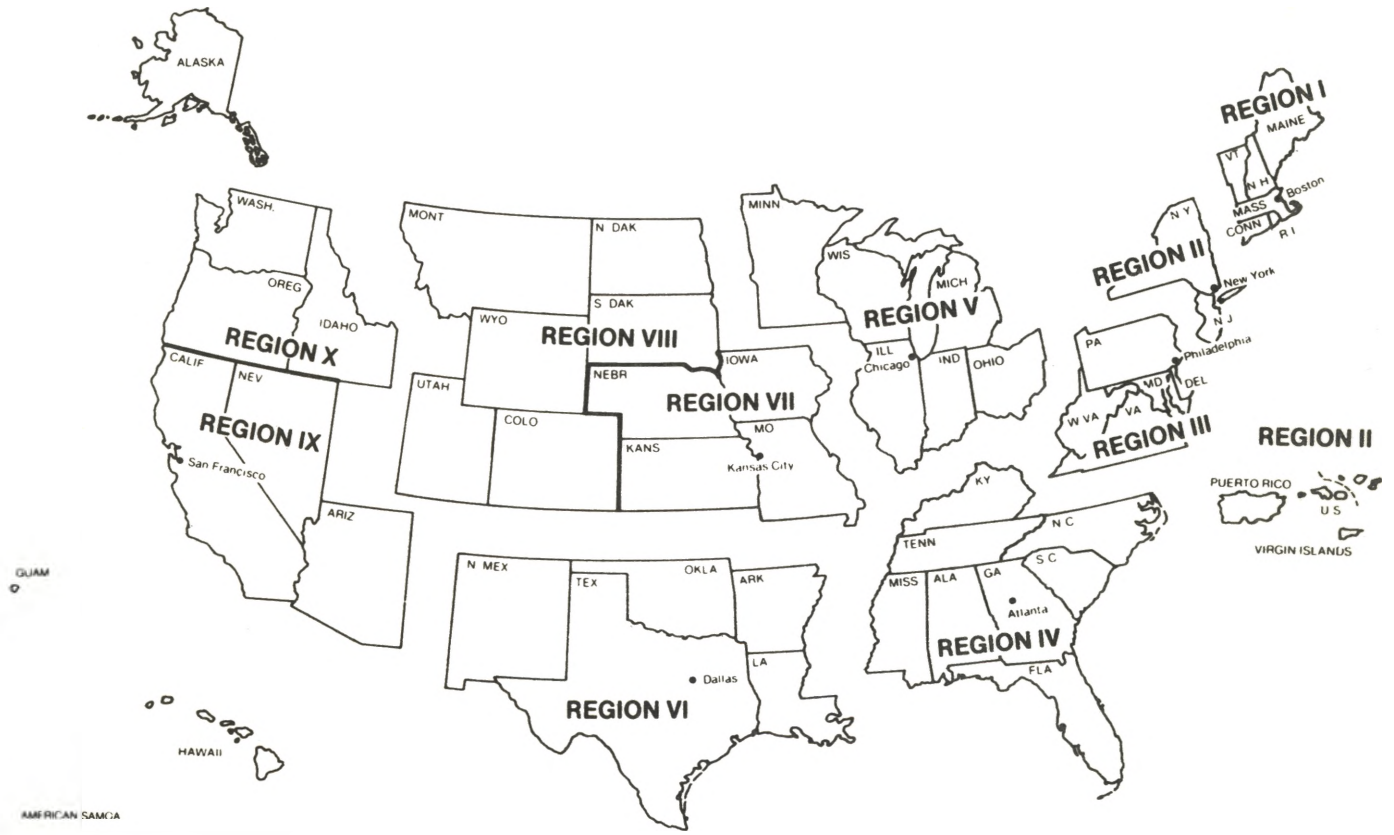

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